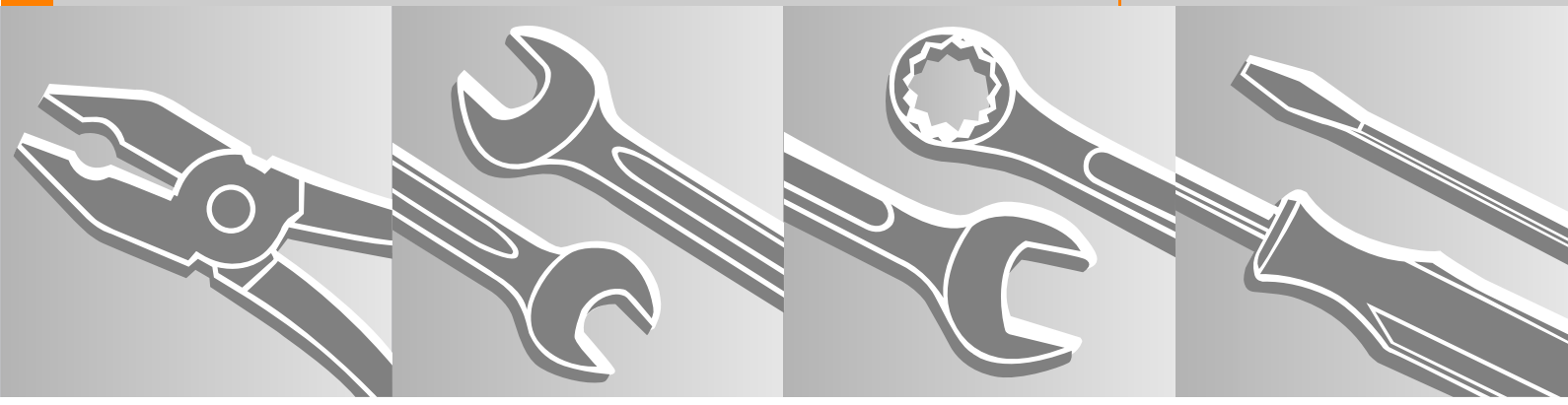
STIHL Series 4144 Powerhead

2008-01



FS 40, FS 50, FS 56

FC 56

KM 56

Contents

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STIHL®

This service manual contains detailed descriptions of all the repair and servicing procedures specific to this power tool.

You should make use of the illustrated parts lists while carrying out repair work. They show the installed positions of the individual components and assemblies.

Refer to the latest edition of the relevant parts list to check the part numbers of any replacement parts.

A fault on the machine may have several causes. To help locate the fault, consult the troubleshooting charts for all assemblies and systems in this manual and the "STIHL Service Training System".

Refer to the “Technical Information” bulletins for engineering changes which have been introduced since publication of this service manual. Technical information bulletins also supplement the parts list until a revised edition is issued.

The special tools mentioned in the descriptions are listed in the chapter on "Special Servicing Tools" in this manual. Use the part numbers to identify the tools in the "STIHL Special Tools" manual. The manual lists all special servicing tools currently available from STIHL.

Symbols are included in the text and pictures for greater clarity.
The meanings are as follows:

In the descriptions:

● = Action to be taken as shown in the illustration above the text

– = Action to be taken that is not shown in the illustration above the text

In the illustrations:

➔ Pointer

➔ Direction of movement

📖 4.2 = Reference to another chapter, i.e. chapter 4.2 in this example

Service manuals and all technical information bulletins are intended exclusively for the use of properly equipped repair shops. They must not be passed to third parties.

Always use original STIHL replacement parts.
They can be identified by the STIHL part number,
the STIHL logo and the
STIHL parts symbol
This symbol may appear alone on small parts.

Storing and disposing of oils and fuels

Collect fuel or lubricating oil in a clean container and dispose of it properly in accordance with local environmental regulations.

If the engine is started up in the course of repairs or maintenance work, observe all local and country-specific safety regulations as well as the safety precautions and warnings in the instruction manual.

Gasoline is an extremely flammable fuel and can be explosive in certain conditions.

Always wear suitable protective gloves for operations in which components are heated for assembly or disassembly.

Improper handling may result in burns or other serious injuries.

Do not smoke or bring any fire, flame or other source of heat near the fuel. All work with fuel must be performed outdoors only. Spilled fuel must be wiped away immediately.

Always perform leakage test after working on the fuel system and the engine.

3. Specifications

3.1 Engine

	FS 40	FS 50, 56, FC 56, KM 56
Displacement:	27.2 cm^3	27.2 cm^3
Bore:	34 mm	34 mm
Stroke:	30 mm	30 mm
Engine power to ISO 8893:	0.7 kW (1.0 bhp) at 8,500 rpm	0.8 kW (1.1 bhp) at 8,500 rpm
Max. permissible speed (with cutting attachment):	10,000 rpm	10,000 rpm
Idle speed:	2,800 rpm	2,800 rpm
Clutch:	Centrifugal clutch without linings	Centrifugal clutch without linings
Clutch engages at:	4,200 rpm	4,200 rpm
Crankcase leakage test		
at gauge pressure:	0.5 bar	
under vacuum:	0.5 bar	

3.2 Ignition System

Air gap between the ignition module and flywheel:	0.30 mm
Spark plug (suppressed):	NGK CMR 6 H NGK 6 H
Electrode gap:	0.5 mm

3.3 Tightening Torquese

DG and P (Plastoform) screws are used in polymer and light metal components. These screws form a permanent thread when they are installed for the first time. They can be removed and installed as often as necessary without impairing the strength of the screwed assembly, providing the specified tightening torque is observed.
For this reason it is **essential to use a torque wrench.**

Fastener	Thread size	For component	Torque Nm	Remarks
Screw	UNC 8-32	Clutch drum/crankshaft	3,5	
Carrier	3/8“ -24	Carrier, clutch/crankshaft	20,0	5)
Carrier	M 8x1	Carrier, starter side/crankshaft	17,0	
Screw	D 5x20	Muffler/cylinder	9,0	
Screw	D 5x20	Spacer flange/cylinder	6,0	
Screw	D 4x20	Ignition module/cylinder with washer	4,5	
	M 10x1	Spark plug	12,0	
Screw	D 5x60	Engine pan/crankcase/cylinder	9,0	

Remarks:

1) Loctite 242 or 243, medium strength
2) Loctite 270, high strength
3) Loctite 649, high strength
4) Loctite 272, high strength up to 250°C
5) Degrease crankshaft/flywheel and mount oil-free

Use the following procedure when refitting a DG or P screw in an existing thread:

Place the screw in the hole and rotate it counterclockwise until it drops down slightly.
Tighten the screw clockwise to the specified torque.

This procedure ensures that the screw engages properly in the existing thread and does not form a new thread and weaken the assembly.

Coat micro-encapsulated screws with medium strength Loctite 242 or 243 before reinstalling.

Power screwdriver setting for polymer: DG and P screws max. 500 rpm
Do not use an impact wrench for releasing or tightening screws.

Do not mix up screws with and without binding heads.

4. Troubleshooting

4.1 Clutch

Condition	Cause	Remedy
Cutting attachment stops under load at full throttle	Clutch shoes badly worn	Install new clutch
	Clutch drum badly worn	Install new clutch drum
Cutting attachment runs at idle speed	Engine idle speed too high	Readjust idle speed screw **LA**
	Clutch springs stretched or fatigued	Replace the clutch springs or install new clutch
	Clutch spring hooks broken	Replace the clutch springs
Loud noises	Clutch springs stretched or fatigued	Replace all clutch springs
	Clutch shoe retainer broken	Install new clutch
	Clutch shoes and carrier worn	Install new clutch

4.2 Ignition System

Exercise extreme caution while carrying out maintenance and repair work on the ignition system. The high voltages which occur can cause serious or fatal accidents.

Condition	Cause	Remedy
Engine runs roughly, misfires, temporary loss of power	Spark plug boot is loose	Press boot firmly onto spark plug and fit new spring if necessary
	Spark plug sooted, smeared with oil	Clean the spark plug or replace if necessary. If sooting keeps recurring, check air filter
	Fuel/oil mixture – too much oil	Use correct mixture of fuel and oil
	Incorrect air gap between ignition module and flywheel	Set air gap correctly
	Flywheel cracked or has other damage or pole shoes have turned blue	Install new flywheel
	Ignition timing wrong, flywheel out of adjustment, key on crankshaft has sheared off	Locate flywheel properly or install new flywheel
	Weak magnetization in flywheel	Install new flywheel
	Irregular spark	Check operation of switch shaft/ contact springs and ignition module. Faulty insulation or break in ignition lead or short circuit wire. Check ignition lead/ignition module and replace ignition module if necessary. Check operation of spark plug. Clean the spark plug or replace if necessary.
	Crankcase damaged (cracks)	Install new crankcase

Condition	Cause	Remedy
No spark	Spark plug faulty	Install new spark plug
	Faulty insulation or short in short circuit wire	Check short circuit wire for short circuit to ground
	Break in ignition lead or insulation damaged	Check ignition lead, replace ignition module if necessary
	Ignition module faulty	Install new ignition module

4.3 Engine

Always check and, if necessary, repair the following parts before looking for faults on the engine:

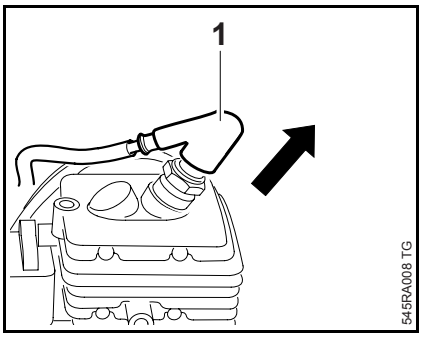
- Air filter
- Fuel system
- Carburetor
- Ignition system

Condition	Cause	Remedy
Engine does not start easily, stalls at idle speed, but operates normally at full throttle	Oil seals in crankcase damaged	Replace the oil seals
	Crankcase leaking or damaged (cracks)	Seal or replace the crankcase
Engine does not deliver full power or runs erratically	Piston ring worn or broken	Fit new piston ring
	Muffler / spark arresting screen carbonized	Clean the muffler (inlet and exhaust), replace spark arresting screen, replace muffler if necessary
	Air filter dirty	Replace air filter
	Fuel hose kinked or torn	Fit new hose or position it free from kinks
Engine overheating	Insufficient cylinder cooling. Air inlets in rewind starter blocked or cooling fins on cylinder very dirty	Thoroughly clean all cooling air openings and the cylinder fins

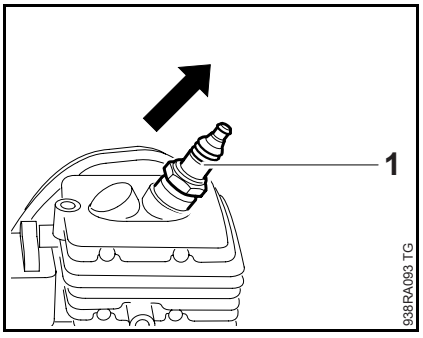
5.1 Clutch Drum

– Troubleshooting, 🕮 4.1

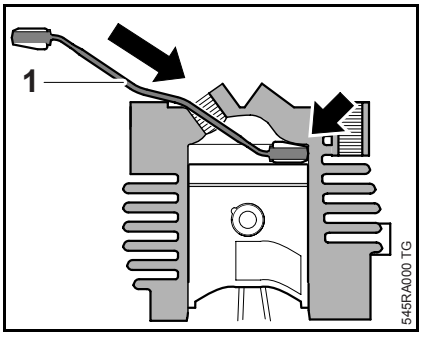
– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"



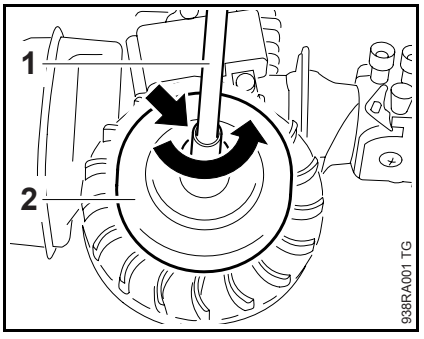
● Pull boot (1) off the spark plug.



● Unscrew the spark plug (1).



● Push the locking strip (1) 0000 893 5904 into the spark plug hole until it butts against the cylinder wall (arrow) as shown.

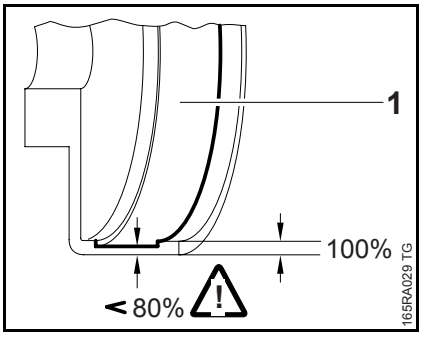


● Insert screwdriver bit (1) 0812 540 1112 through the clutch drum (arrow).

– Loosen the screw – take care not to damage the screw head.

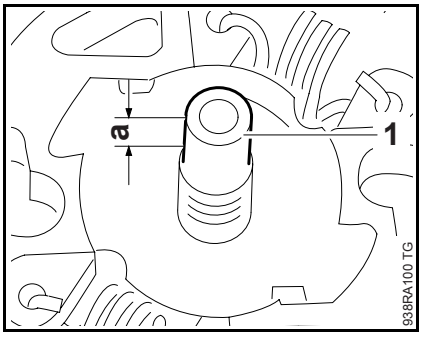
– Pull off the clutch drum (2).

The mounting screw is inside the clutch drum. If the screw is damaged, the clutch drum must be replaced.



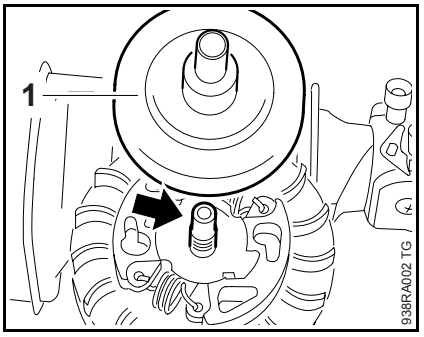
– Inspect the clutch drum (1) for signs of wear.

If there are signs of serious wear on the inside diameter of the clutch drum (1), check the remaining wall thickness. If it is less than about 80% of the original thickness, install a new clutch drum.



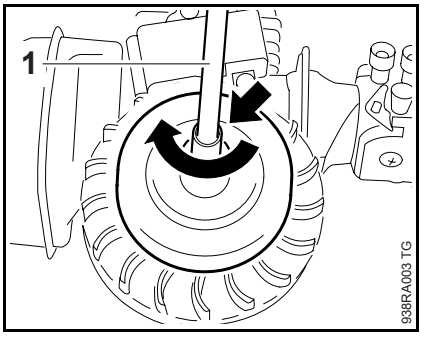
– Clean away old mounting paste.

● Coat crankshaft stub (1) with mounting paste, a = about 10 mm, 🕮 9



– Remove the clutch, 🕮 5.2

● Push clutch drum (1) onto crankshaft stub (arrow) at ignition side.



– Coat thread of mounting screw with Loctite, 🕮 9

● Insert screwdriver bit (1) 0812 540 1112 through the clutch drum (arrow).

– Insert and tighten down the screw firmly – take care not to damage the screw head.

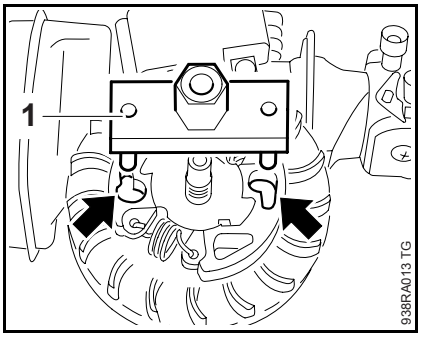
– Reassemble all other parts in the reverse sequence.

– Tightening torques, 🕮 3.3

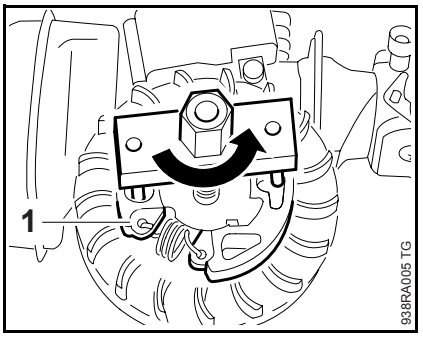
5.2 Clutch

– Block the piston, 🕮 5.1

– Remove the clutch drum, 🕮 5.1

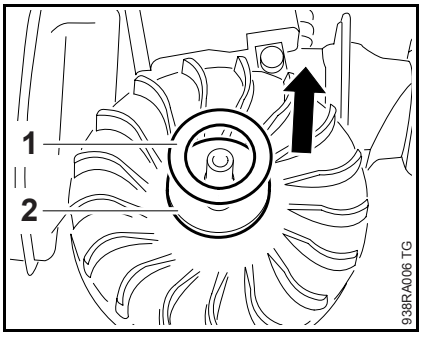


● Position the wrench (1) 4130 890 3600 on the crankshaft stub so that its pins engage the recesses (arrows).



● Unscrew the clutch (1).

The clutch has a right-hand thread.

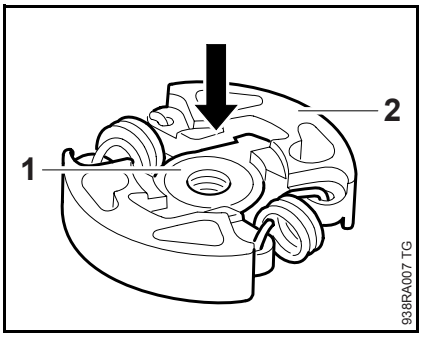


● Remove the cup spring (1) and washer (2).

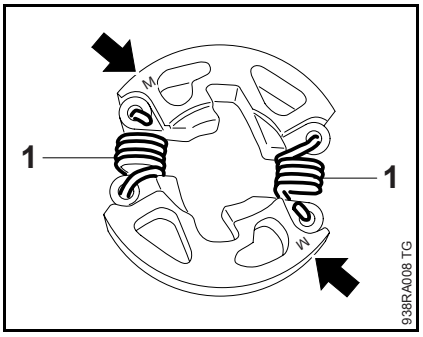
– Check the individual parts and replace if necessary.

If the clutch shoes are worn or damaged, the entire clutch must be replaced together with the cup spring and washer – see parts list.

Always replace worn or damaged clutch springs in pairs.



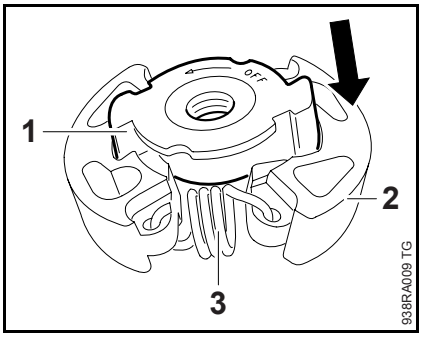
● Push the carrier (1) out of the clutch shoes (2).



- Unhook the springs (1) from the clutch shoes.

Position the clutch shoes so that the markings (arrows) are visible.

– Fit new clutch springs.



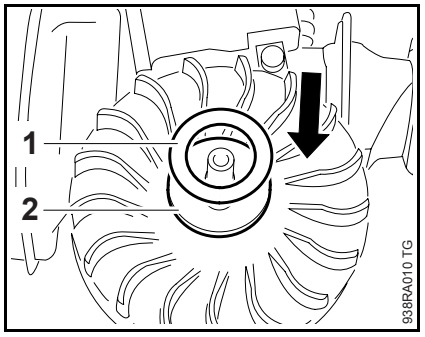
– Position the carrier (1) so that the word "OFF" faces up.

The clutch shoes (2) must be connected by the springs (3) – the springs (3) must be properly engaged in the clutch shoes.

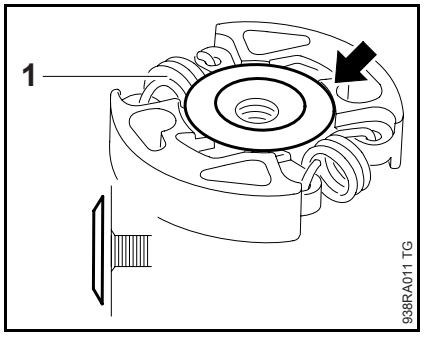
- Hold the carrier (1) against one clutch shoe (2) and hold the other clutch shoe at an angle against the carrier (1), pull the shoes slightly apart and push the carrier into position.

– Push the carrier (1) into the clutch shoes (2) as far as stop.

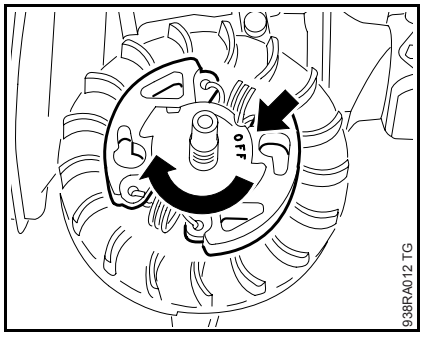
Installing



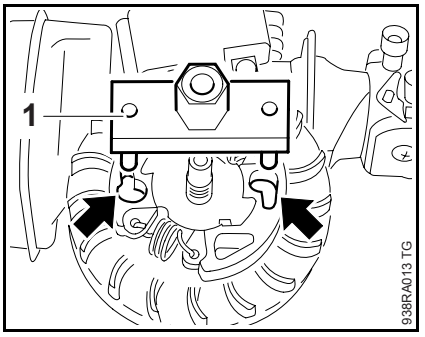
- Push the washer (2) and cup spring (1) onto the crankshaft stub.



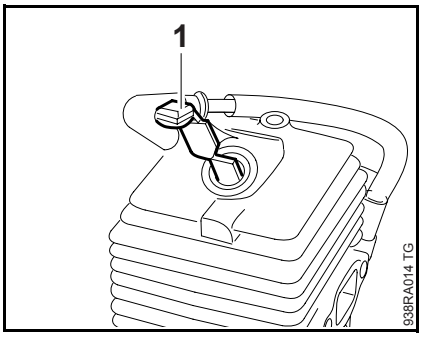
The cup spring (1) must be properly seated in the carrier (arrow) and must not slip out of position while the clutch is being screwed home.



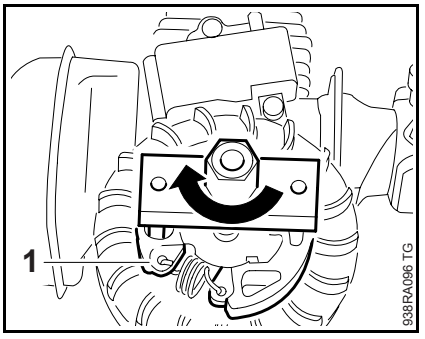
- Fit the clutch so that the word "OFF" (arrow) faces up.



- Position the wrench (1) 4130 890 3600 on the crankshaft stub so that its pins engage the recesses (arrows).



- Check position of locking strip (1).



- Tighten down the clutch (1) firmly.

– Tightening torques, 🕮 3.3

– Remove the locking strip from the cylinder.

– Reassemble all other parts in the reverse sequence.

Removal and installation of the engine is described in the service manual for "Series 4144 Components – FS, FC, KM".

6.1 Leakage Test

Defective oil seals and gaskets or cracks in castings are the usual causes of leaks. Such faults allow supplementary air to enter the engine and upset the fuel-air mixture.

This makes adjustment of the prescribed idle speed difficult, if not impossible.

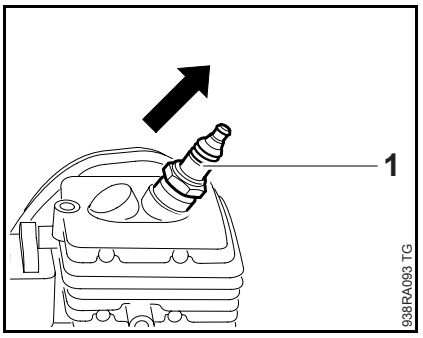
Moreover, the transition from idle speed to part or full throttle is not smooth.

Always perform the vacuum test first and then the pressure test.

The engine can be checked thoroughly for leaks with the pump 0000 850 1300.

The engine does not need to be removed for the leakage test.

6.1.1 Preparations



– Remove the fan housing – see service manual for "Series 4144 Components – FS, FC, KM"

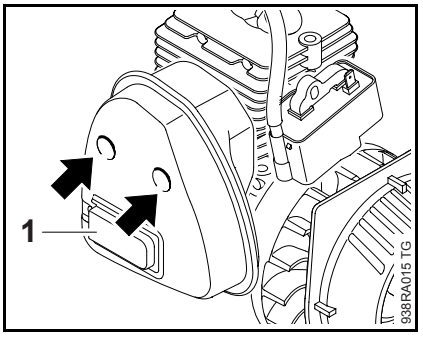
– Remove the spark plug boot with cap.

● Unscrew the spark plug (1).

– Set the piston to top dead center. This can be checked through the spark plug hole.

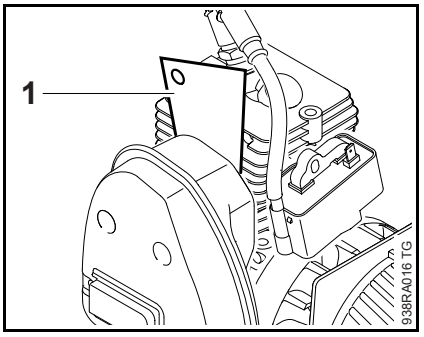
– Fit the spark plug (1) and tighten it down firmly.

– Tightening torques, 🕮 3.3



● Loosen the screws (arrows).

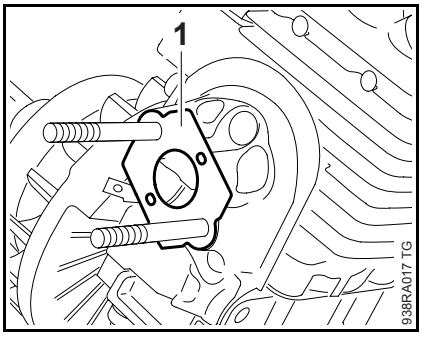
– Lift the muffler (1).



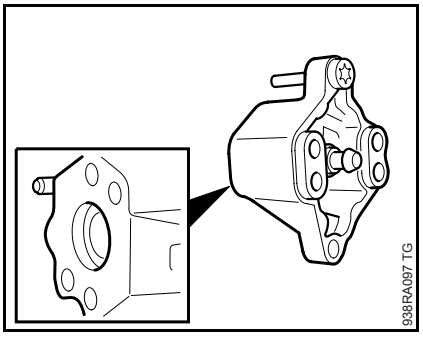
● Fit the sealing plate (1) 0000 855 8106 between the cylinder exhaust port and muffler and tighten down the screws moderately.

The sealing plate must completely fill the space between the two screws.

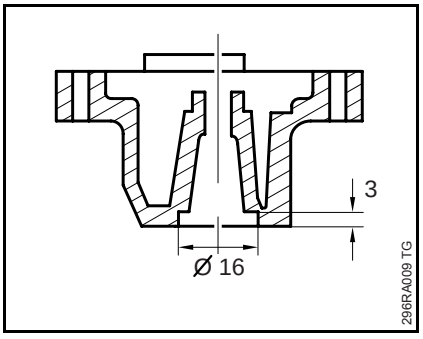
– Remove the carburetor – see service manual for "Series 4144 Components – FS, FC, KM"



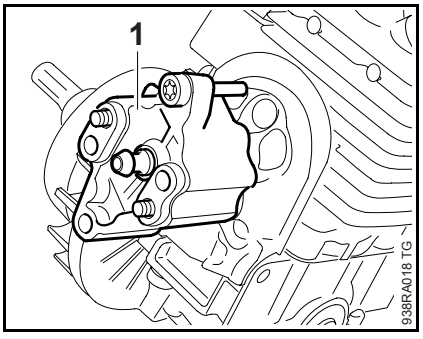
Check that the gasket (1) is in position.



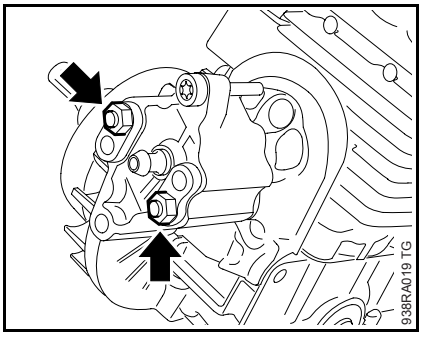
The new flange 5910 850 4200 replaces the previous flange 1128 850 4200. The new flange has an additional recess (arrow) in its sealing face. The previous flange 1128 850 4200 can be modified accordingly.



Modify the test flange 1128 850 4200 as shown.



- Fit the test flange (1) 5910 850 4200.

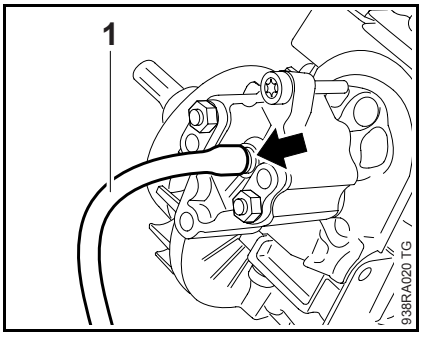


- Fit the nuts (arrows) and tighten them down firmly.

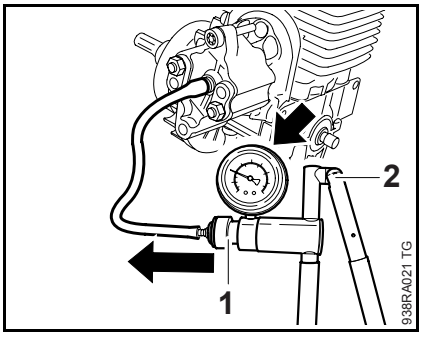
6.1.2 Vacuum Test

Oil seals tend to fail when subjected to a vacuum, i.e. the sealing lip lifts away from the crankshaft during the piston's induction stroke because there is no internal counterpressure.

A test can be carried out with pump 0000 850 1300 to detect this kind of fault.



- Connect suction hose (1) of pump 0000 850 1300 to nipple (arrow).



- Push ring (1) to the left.

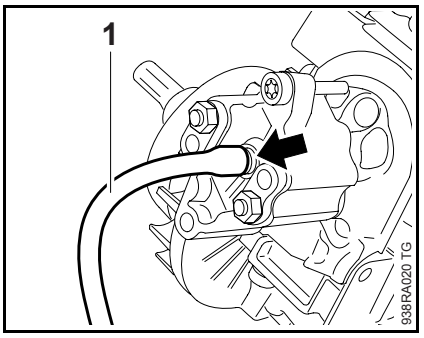
- Operate the lever (2) until the pressure gauge (arrow) indicates a vacuum of 0.5 bar.

If the vacuum reading remains constant, or rises to no more than 0.5 bar within 20 seconds, it can be assumed that the oil seals are in good condition.
However, if the pressure continues to rise (reduced vacuum in the engine), the oil seals must be replaced, 🕮 6.2.

– After finishing the test, push the ring to the right to vent the pump.

– Continue with pressure test, 🕮 6.1.3

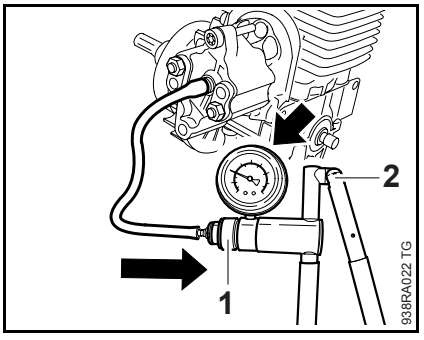
6.1.3 Pressure Test



Carry out the same preparations as for the vacuum test, 🕮 6.1.2

– Always carry out the vacuum test, before the pressure test, 🕮 6.1.2

● Connect pressure hose (1) of pump 0000 850 1300 to nipple (arrow).



● Push ring (1) to the right.

● Operate the lever (2) until the pressure gauge (arrow) indicates a pressure of 0.5 bar. If this pressure remains constant for at least 20 seconds, the engine is airtight.

– If the pressure drops below 0.5 bar within 20 seconds, the leak must be located and the faulty part replaced.

To find the leak, coat the suspect area with oil and pressurize the engine. Bubbles will appear if a leak exists.

– After finishing the test, push the ring to the left to vent the pump – disconnect the hose.

– Remove the test flange.

– Install the carburetor – see service manual for "Series 4144 Components – FS, FC, KM"

– Loosen the muffler and pull out the sealing plate.

– Tighten down the muffler firmly.

– Reassemble all other parts in the reverse sequence.

– Tightening torques, 🕮 3.3

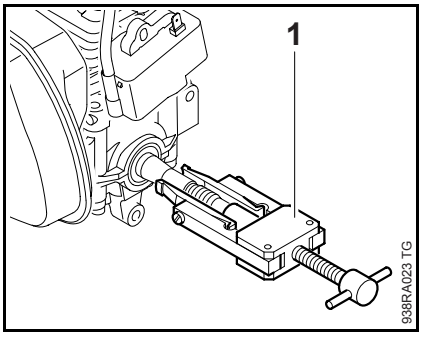
6.2 Oil seals

It is not necessary to disassemble the engine to replace the oil seals.

Ignition side

– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

– Remove the flywheel, 🕮 7.5



– Free off the oil seal in its seat by tapping it with a suitable tube or a punch.

● Apply puller (1) 5910 890 4400 with No. 3.1 jaws 0000 893 3706.

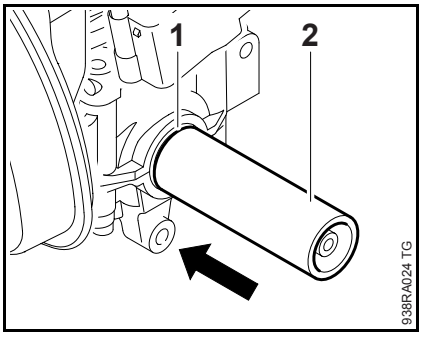
– Clamp the puller arms.

– Pull out the oil seal.

Take care not to damage the crankshaft stub.

– Clean the sealing face, 🕮 9

– Lubricate sealing lips of new oil seal with grease, 🕮 9



– Apply a thin coating of sealant to the outside diameter of the oil seal, 🕮 9

– Carefully push the oil seal, open side facing the engine, over the crankshaft stub
– avoid touching the thread so as not to damage the rubber lip.

● Use press sleeve (2) 1129 893 2400 to install the oil seal (1).

The seating face must be flat and free from burrs.

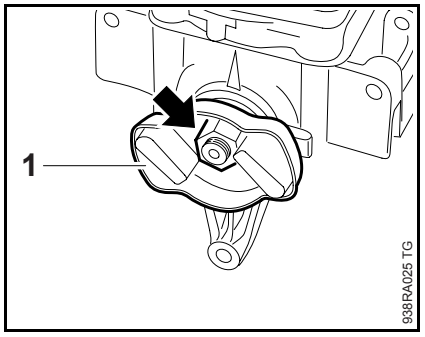
– Wait about one minute, then rotate the crankshaft several times.

– Degrease the crankshaft taper, 🕮 9

– Reassemble all other parts in the reverse sequence.

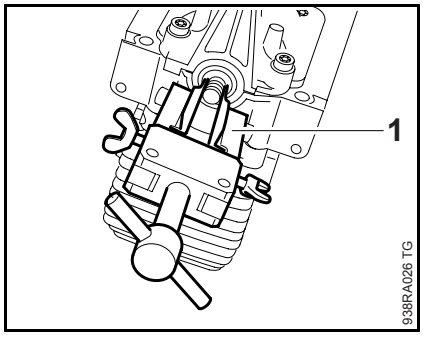
Carrier side

– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"



– Block the piston, 🕮 5.1

● Apply wrench to hexagon (arrow) and unscrew the carrier (1).



– Free off the oil seal in its seat by tapping it with a suitable tube or a punch.

● Apply puller (1) 5910 890 4400 with No. 3.1 jaws 0000 893 3706.

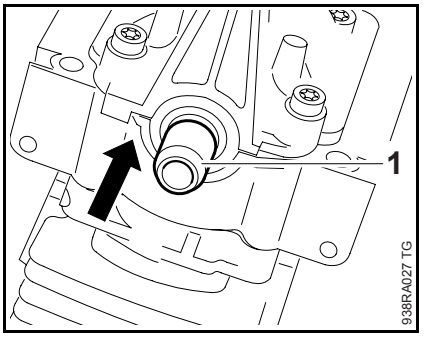
– Clamp the puller arms.

– Pull out the oil seal.

Take care not to damage the crankshaft stub.

– Clean the sealing face, 🕮 9

– Lubricate sealing lips of new oil seal with grease, 🕮 9

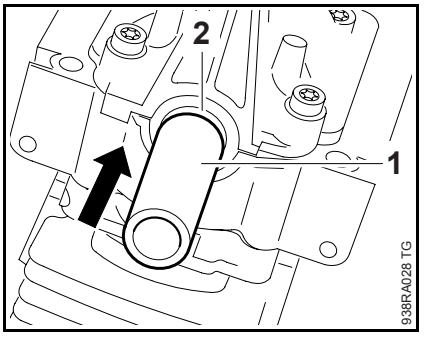


● Fit the installing sleeve (1) 4119 893 4600.

– Apply a thin coating of sealant to the outside diameter of the oil seal, 🕮 9

– Slip the oil seal, closed side facing outwards, over the installing sleeve.

– Remove the installing sleeve (1).



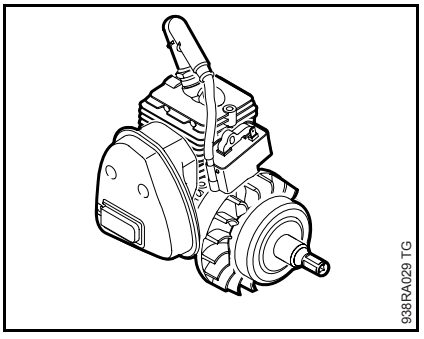
- Use press sleeve (1) 1121 893 2400 to install the oil seal (2).

– Wait about one minute, then rotate the crankshaft several times.

– Install the engine – see service manual for "Series 4144 Components – FS, FC, KM"

– Tightening torques, 🕮 3.3

6.3 Removing and Installing the Engine



The complete engine has to be removed for access to the piston, cylinder and crankshaft.

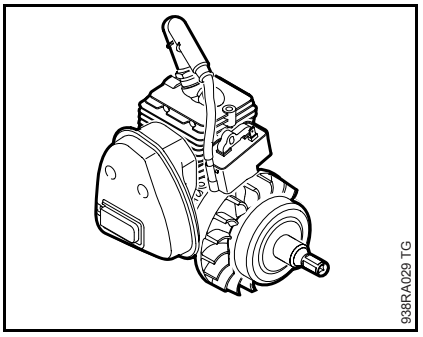
See service manual for "Series 4144 Components – FS, FC, KM"

6.4 Removing and Installing the Cylinder

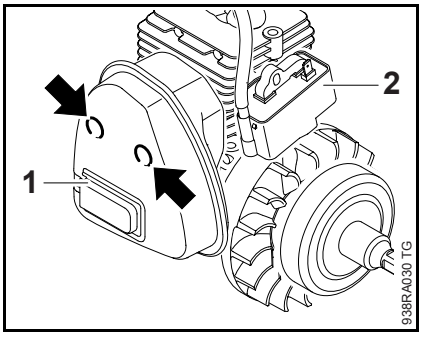
Before removing the piston, decide whether or not the crankshaft, clutch or carrier have to be removed as well.

Cylinder installed
To remove the clutch or carrier, block the.crankshaft by inserting the locking strip in the spark plug hole.

Cylinder removed
To remove the clutch or carrier, block the crankshaft by resting the piston on the wooden assembly block 1108 893 4800.



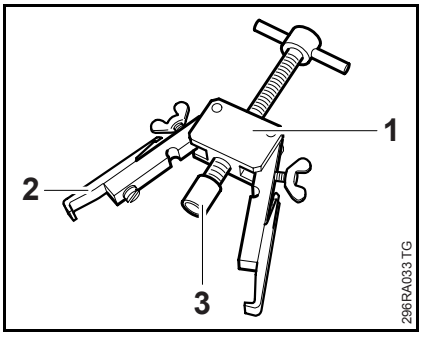
– Remove the engine and pull off the carburetor – see service manual for "Series 4144 Components – FS, FC, KM"



- Take out the screws (arrows).

– Remove the muffler (1).

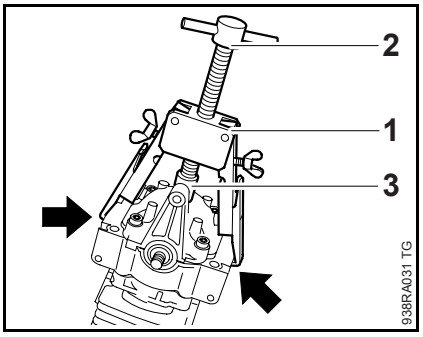
– Remove the ignition module (2), 🕮 7.1.1



– Prepare the puller (1) 5910 890 4400.

- Fit the No. 2 jaws (2) 0000 893 3700.

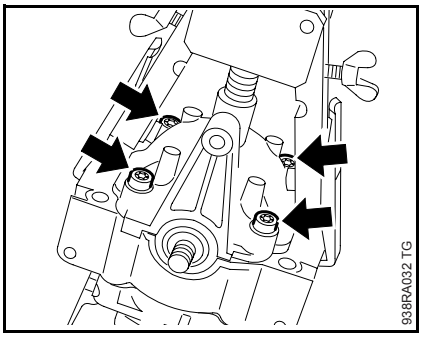
- Screw the bushing (3) 1108 893 4500 onto the puller's spindle.



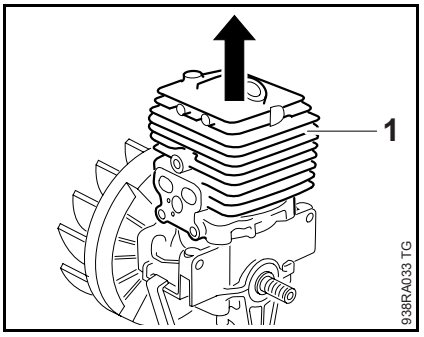
- Apply the puller (1) 5910 890 4400 with the jaws under the crankcase ribs (arrows) and line up the spindle (2) so that the bushing (3) is centered on the engine pan.

- Turn the spindle (2) clockwise until the puller sits tightly.

Do not overtighten the spindle because the jaws may slip off or damage the crankcase ribs.



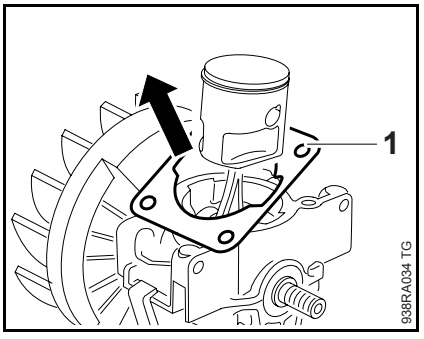
- Take out the cylinder screws (arrows).



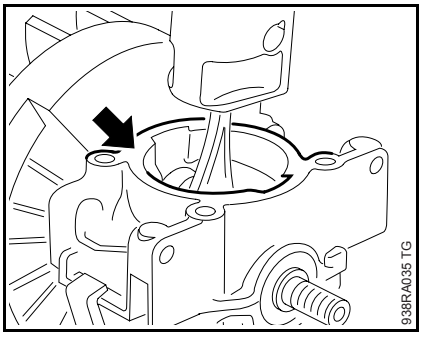
- Carefully lift the cylinder (1) away.

Do not use pointed or sharp-edged tools for this job.

– Check the cylinder and replace if necessary.



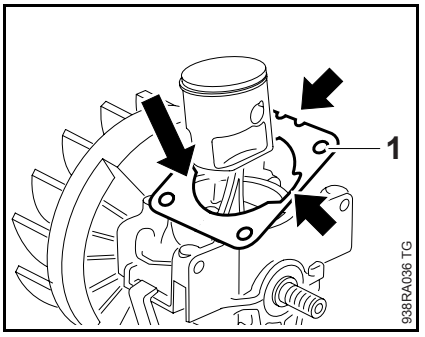
- Remove the cylinder gasket (1).



– Inspect and clean the sealing face (arrow), 🕮 9

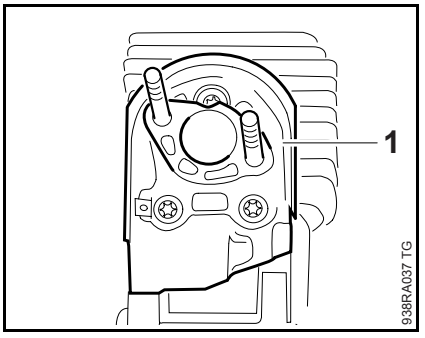
The sealing face must be in perfect condition. Always replace components with damaged sealing faces, 🕮 4.3.

Always use a new cylinder gasket when re-installing the cylinder.



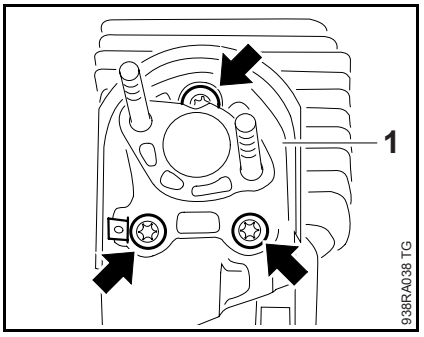
– Line up the cylinder gasket (1) so that the tab and cutouts (arrows) match the contours of the crankcase.

- Place the cylinder gasket (1) in position.



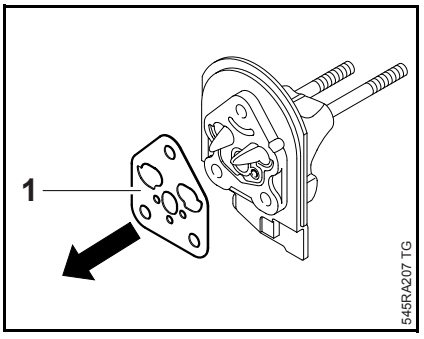
– Inspect the spacer flange (1) and replace it if necessary – even very minor damage can result in engine running problems, 🕮 4.3

In a new cylinder is installed, the spacer flange must be transferred from the old cylinder.

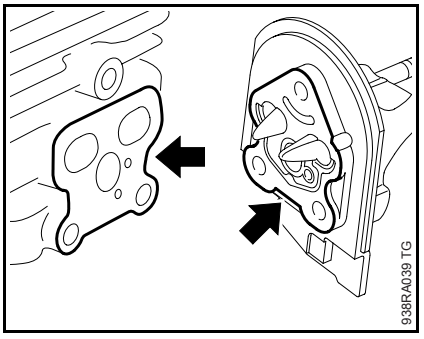


- Take out the screws (arrow) together with the connector tag.

– Remove the spacer flange (1).



– Remove the gasket (1)
  – always install a new gasket

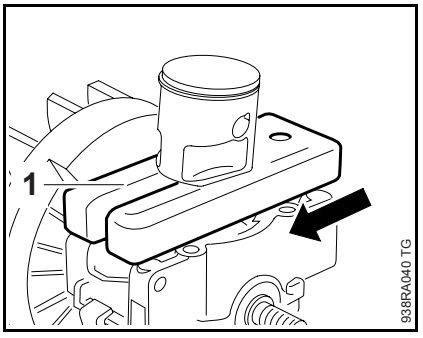


- Inspect and clean the sealing faces (arrows) and remove any gasket residue, 🕮 9

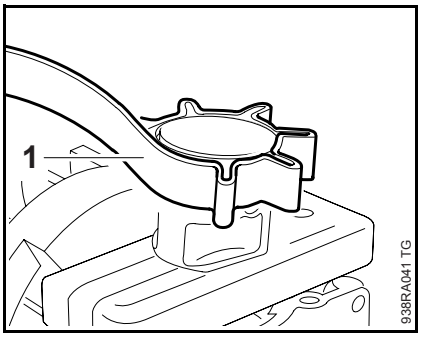
– Check the sealing faces on the cylinder intake and exhaust ports.

The sealing faces must be in perfect condition. If the sealing faces are damaged, install a new cylinder or spacer flange.

– Inspect the piston and piston rings and replace if necessary, 🕮 6.7



- Slide the wooden assembly block (1) 1108 893 4800 between the piston and crankcase.

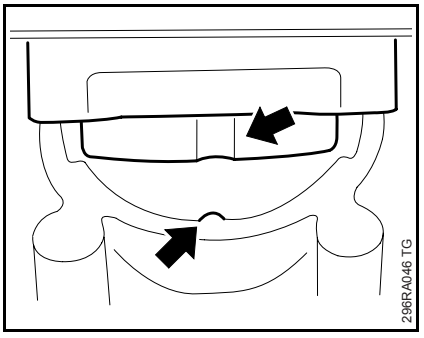


– Lubricate the piston, piston ring and cylinder wall with oil, 🕮 9

- Use the clamping strap (1) 0000 893 2600 to compress the ring around the piston.

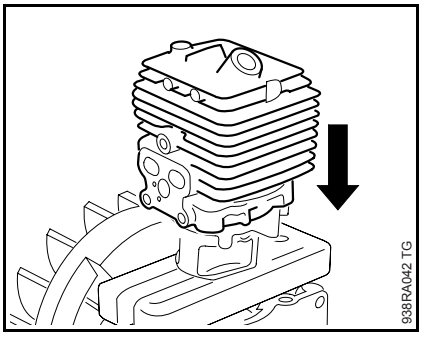
– Check correct installed position of ring, 🕮 6.7.1

Apply the clamping strap (1) so that the piston ring does not project beyond the cylinder wall.



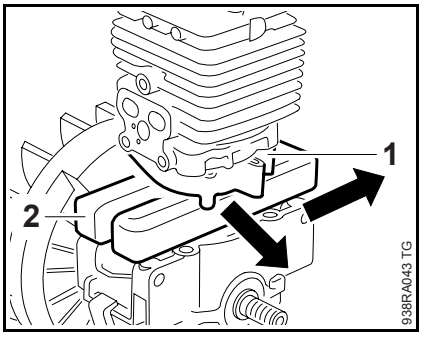
- Align the cylinder so that the recess in the cylinder engages the projection on the crankcase (arrows).

Take care not to damage the cylinder gasket.



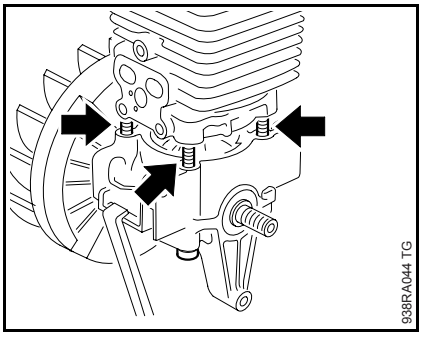
While sliding the cylinder over the piston, hold the clamping strap tightly around the piston so that the ring does not project
– it might otherwise break.

- Slide the cylinder over the piston, the clamping strap moves downwards at the same time.



● Remove the clamping strap (1) and wooden assembly block (2).

Make sure the cylinder gasket is properly seated.

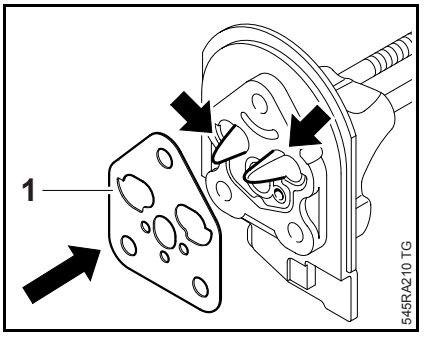


– Push the cylinder fully home.

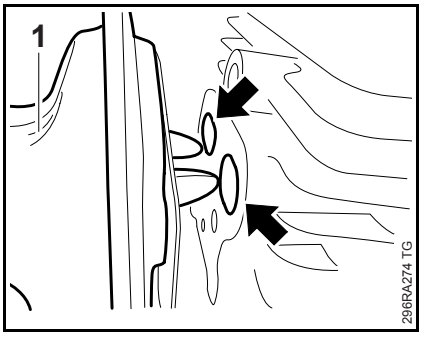
● Insert the screws (arrows) to hold the cylinder and gasket in position.

– Tighten down the screws in an alternate pattern.

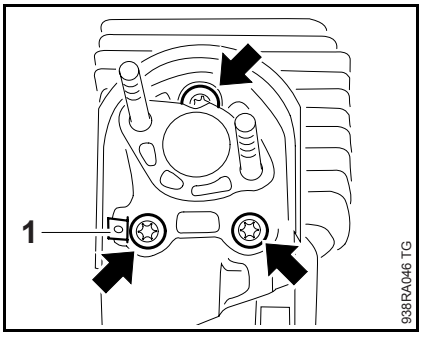
– Remove the puller.



● Fit the new gasket (1) over the guides (arrows) on the spacer flange.

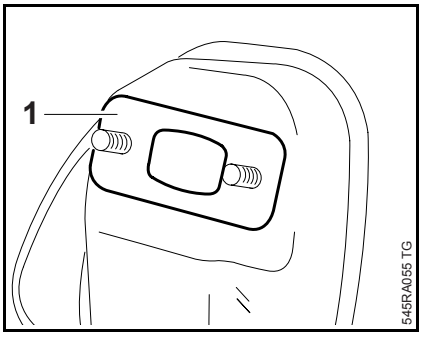


● Position the spacer flange (1) with gasket against the cylinder intake port so the guides engage the openings (arrows).



– Fit the connector tag (1).

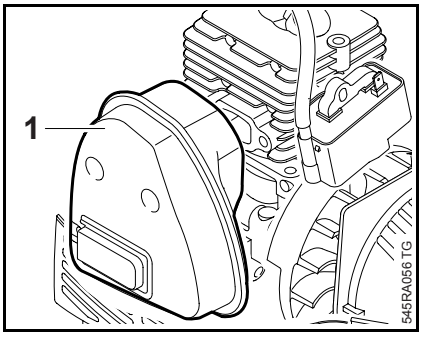
● Insert screws (arrows) and tighten them down firmly.



Use a new exhaust gasket.

– Insert the screws.

● Push the exhaust gasket (1) over the screws.



● Carefully place the muffler (1) in position.

– Fit the screws with washers and check correct position of exhaust gasket again.

– Insert screws and tighten them down firmly.

– Tightening torques, 🕮 3.3

– Install the ignition module, 🕮 7.1.1

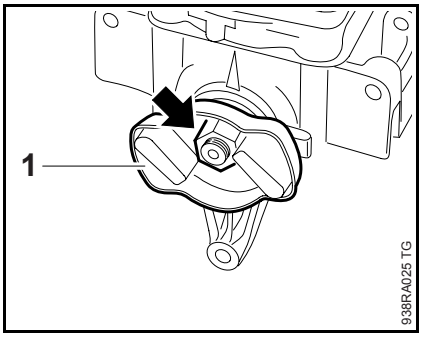
– Reassemble all other parts in the reverse sequence.

6.5 Crankshaft

6.5.1 Removing and Installing

– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

The puller is not necessary for removal of the crankshaft.



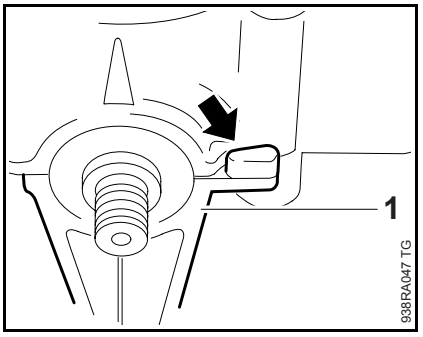
– Block the piston, 🕮 5.1

– Remove the flywheel, 🕮 7.5

● Apply wrench to hexagon (arrow) and unscrew the carrier (1).

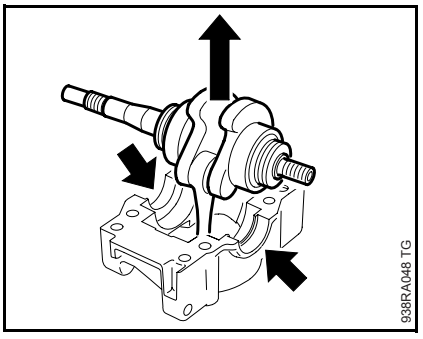
– Remove the cylinder, 🕮 6.4

– Remove the piston, 🕮 6.7

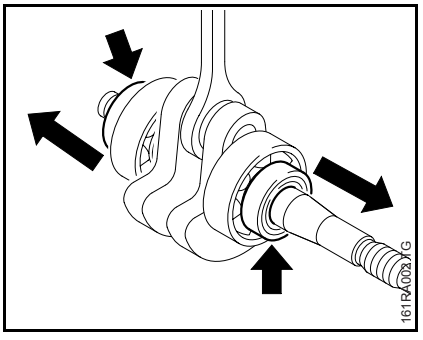


● Loosen the engine pan (1) at the lug (arrow).

– Remove the engine pan.

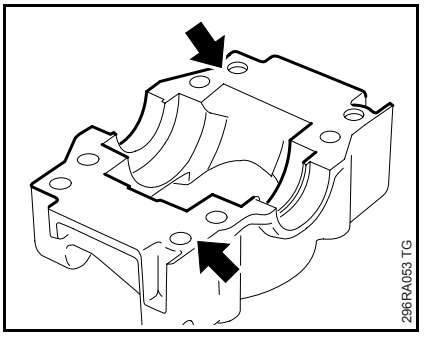


● Release the crankshaft from the bearing seats (arrows) and take it out of the crankcase.



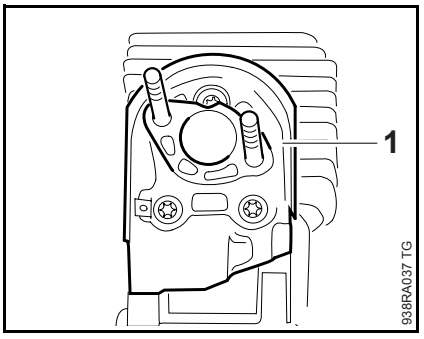
● Pull the oil seals (arrows) off the crankshaft stubs.

– Check the crankshaft and ball bearings and replace if necessary, 🕮 6.5.1



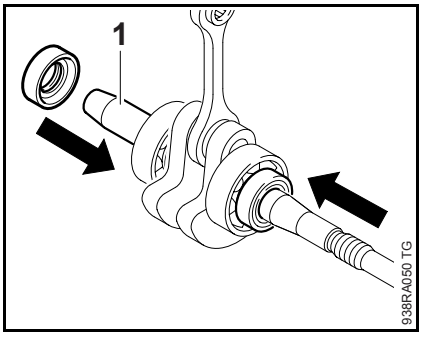
– Inspect the crankcase and sealing faces (arrows) for the engine pan and cylinder, clean and remove gasket residue if necessary, 🕮 9

The sealing faces must be in perfect condition. Always replace components with damaged sealing faces.



– Check the spacer flange (1) and replace if necessary, 🕮 6.4

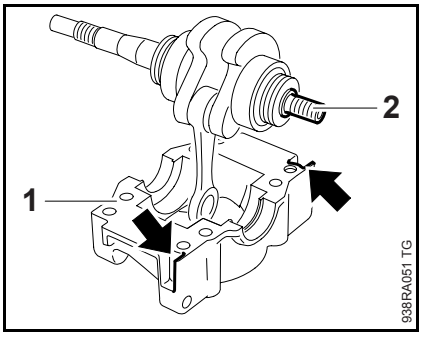
In a new cylinder is installed, the spacer flange must be transferred from the old cylinder – always install a new gasket, 🕮 6.4.



- Fit the installing sleeve (1) 4119 893 4600.

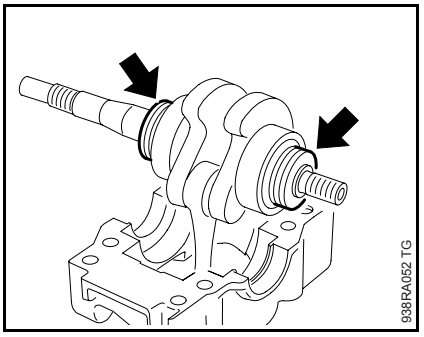
- Push the new oil seals, open side facing the ball bearings, on to the crankshaft stubs.

At the ignition side, carefully slip the oil seal over the crankshaft stub without touching the thread
– to avoid damaging the rubber lip.

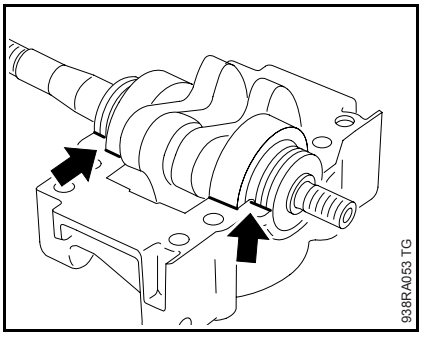


– Position the crankcase (1) so that the bearing seats face up.

- Before fitting the crankshaft in the crankcase, line it up so that the short stub (2) is at the same side as the recesses (arrows).

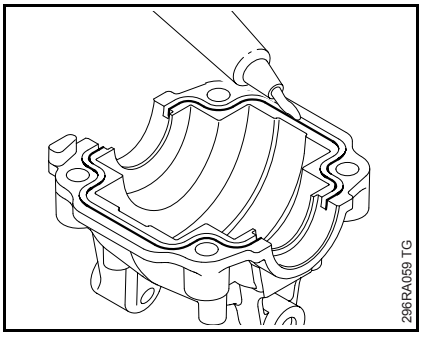


- Apply thin coating of sealant to outside diameter (arrows) of the oil seals, 🕮 9



– Position the crankshaft, connecting rod first, in the crankcase.

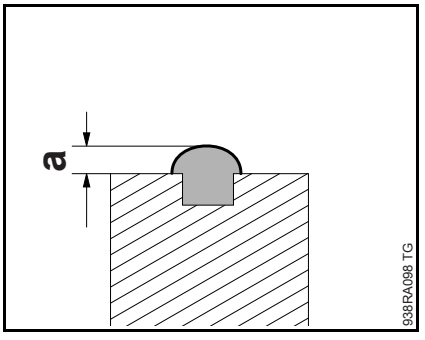
- Place the crankshaft with bearings and oil seals in the bearing seats, making sure the oil seals are firmly against their stops (arrows) in the crankcase.



– Inspect and clean the sealing faces on the engine pan and remove any gasket residue, 🕮 9

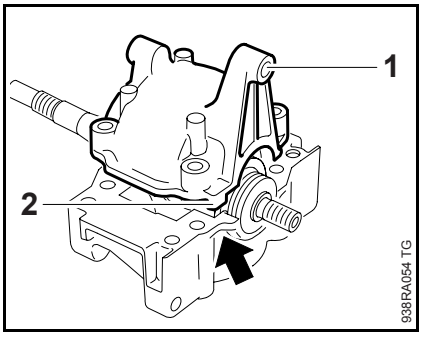
The sealing faces must be in perfect condition. Always replace components with damaged sealing faces.

- Apply sealant to the groove in the sealing face, 🕮 9



- The bead of sealant should be about 2 - 3 mm high (a).

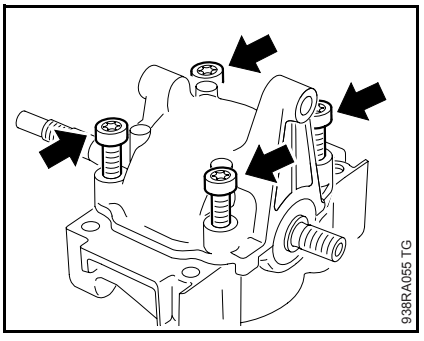
Make sure the sealant does not project into the crankcase.



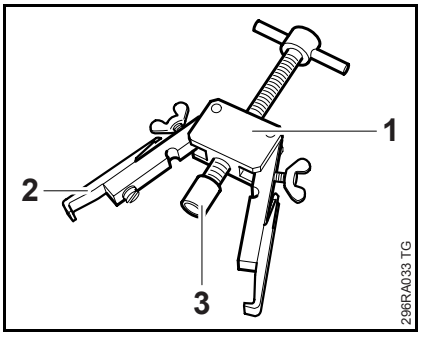
– Line up the engine pan so that the lug (2) is on the same side as the crankcase contour (arrow).

● Place the engine pan (1) on the sealing face.

Press the engine pan carefully into position so that the sealant is evenly distributed.



● Insert the cylinder base screws (arrows) in the holes to hold the engine pan in position.

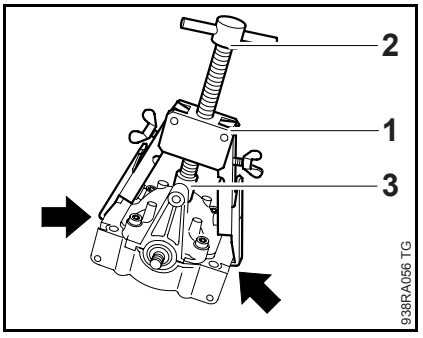


– Prepare the puller (1) 5910 890 4400.

● Fit the No. 2 jaws (2) 0000 893 3700.

● Screw the bushing (3) 1108 893 4500 onto the puller's spindle.

Take care not to damage the crankshaft stub.



● Apply the puller (1) 5910 890 4400 with the jaws under the crankcase ribs (arrows) and line up the spindle (2) so that the bushing (3) is centered on the engine pan.

● Turn the spindle (2) clockwise until the puller sits tightly.

Do not overtighten the spindle because the jaws may slip off or damage the crankcase ribs.

– Install the cylinder, 🕮 6.4

– Tightening torques, 🕮 3.3

– Remove the puller.

– Clean the crankshaft stubs, 🕮 9

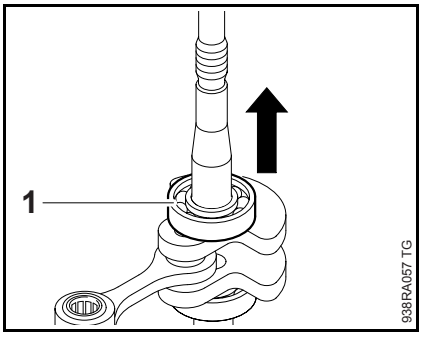
– Install the engine – see service manual for "Series 4144 Components – FS, FC, KM"

– Reassemble all other parts in the reverse sequence.

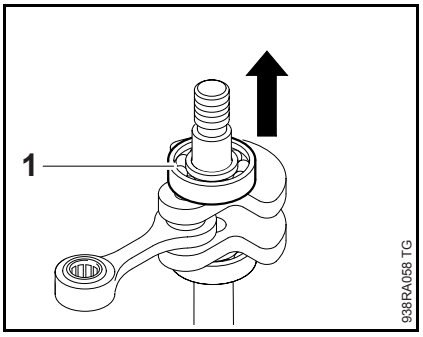
6.6 Bearings / Crankshaft

– Remove the crankshaft, 🕮 6.5.1

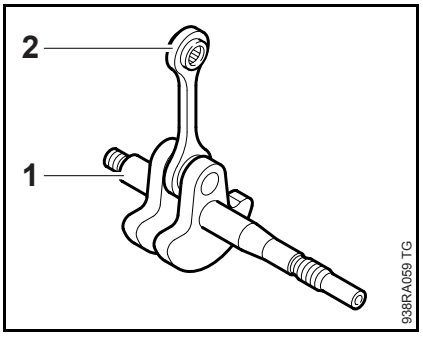
– Pull off the oil seals, 🕮 6.5.1



● Pull the ball bearing (1) off the tapered crankshaft stub.



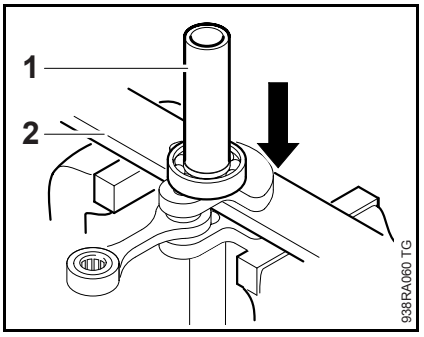
● Pull the ball bearing (1) off the straight crankshaft stub.



The crankshaft (1), connecting rod (2) and needle bearing form an inseparable unit.

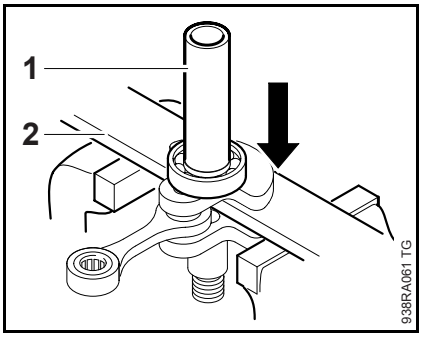
When fitting a replacement crankshaft, always install new ball bearings and oil seals.

– Before installing, clean the crankshaft, 🕮 9



Use a firm base (2) to protect the crankshaft.

● Apply a suitable sleeve (1) to the inner race of the ball bearing at the carrier side and press it home as far as stop.



Use a firm base (2) to protect the crankshaft.

● Apply a suitable sleeve (1) to the inner race of the ball bearing at the ignition side and press it home as far as stop.

– Lubricate needle bearings in small end and on crankshaft with oil.

– Install the piston, 🕮 6.7

– Fit new oil seals and install the crankshaft, 🕮 6.5.1

– Install the engine – see service manual for "Series 4144 Components – FS, FC, KM"

– Tightening torques, 🕮 3.3

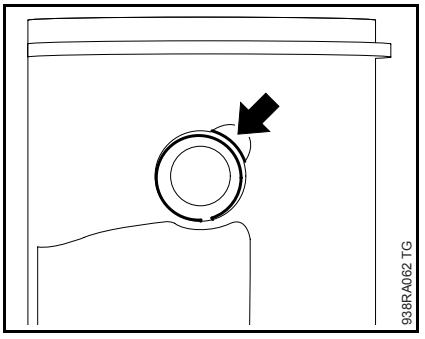
– Reassemble all other parts in the reverse sequence.

6.7 Piston

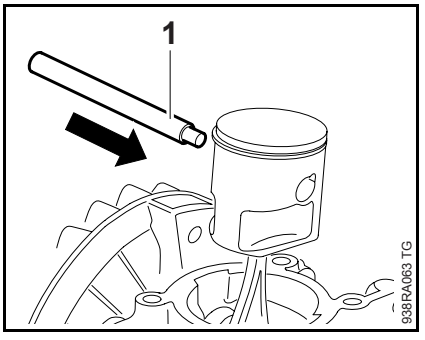
– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

– Remove the cylinder, 🕮 6.4

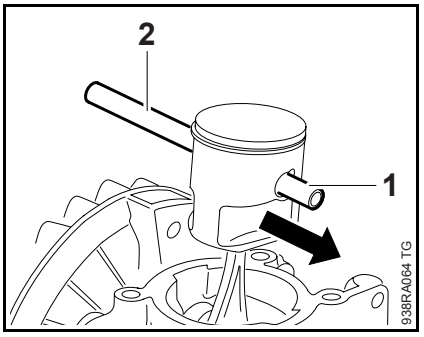
The piston has only one snap ring. It is fitted at the carrier side (short crankshaft stub).



● Use a suitable tool to grip the hookless snap ring at the recess (arrow) and ease it out.

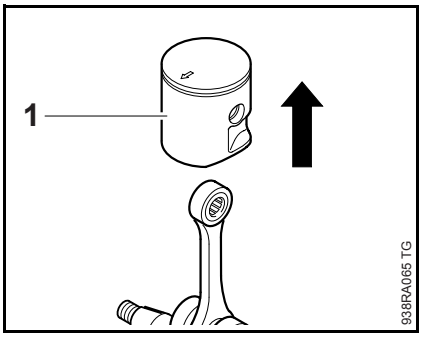


● Apply assembly drift (1) 1130 893 4700, small diameter first, to the ignition side of the piston.



- Use the assembly drift (2) 1130 893 4700 to push the piston pin (1) out of the piston.

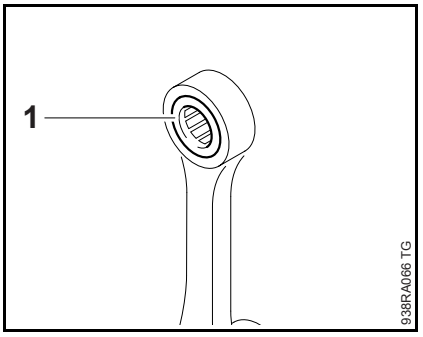
If the piston pin is stuck, release it by tapping the end of the drift lightly with a hammer.
Hold the piston steady during this process to ensure that no jolts are transmitted to the connecting rod.



- Remove the piston (1) from the connecting rod.

– Inspect the piston and replace it if necessary

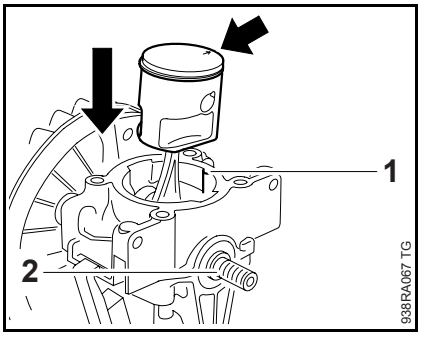
– Inspect the piston ring and replace if necessary, 🕮 6.7.1



- Check the needle cage (1) and clean it if necessary

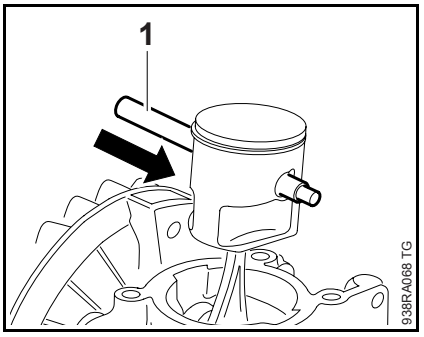
A new crankshaft must be installed if the needle cage is damaged, 🕮 9.

– Lubricate the needle bearing with oil.

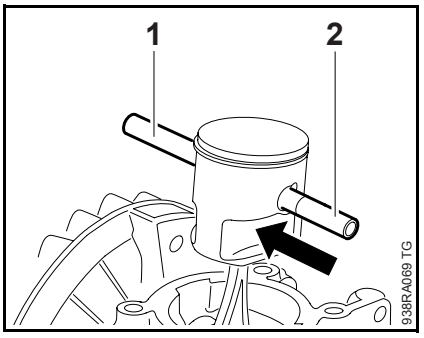


- Line up the piston as shown so that the arrow (arrow) on the piston crown faces the crankcase rib (1) and the short crankshaft stub (2) is on the right.

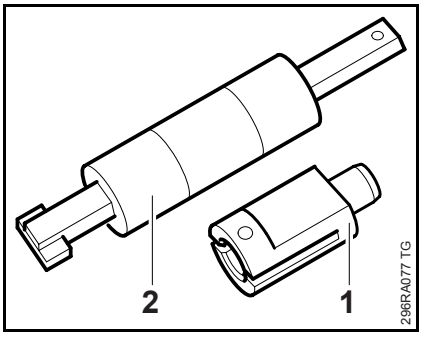
- Place the piston on the connecting rod.



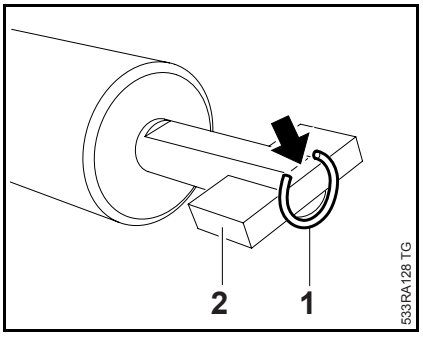
- Push the assembly drift (1) 1130 893 4700, small diameter first, through the piston and small end (needle cage).



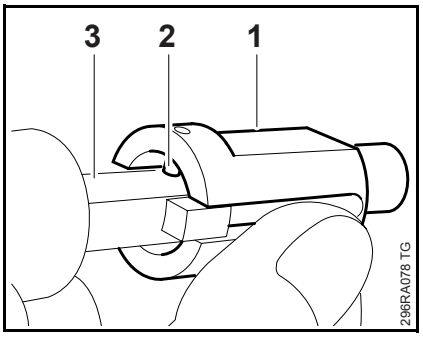
- Fit the piston pin (2) on the assembly drift (1) and slide it into the piston.



- Remove the sleeve (1) 5910 893 1708 from the installing tool (2) 5910 890 2208.

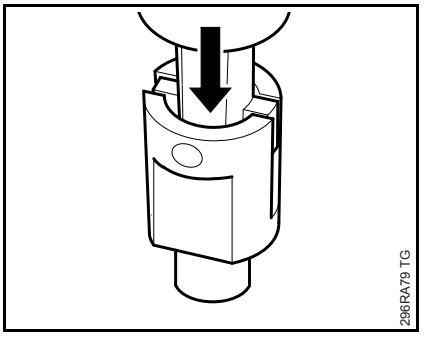


- Attach the snap ring (1) to the magnet (2) so that the snap ring gap is on the flat side of the tool's shank (arrow).



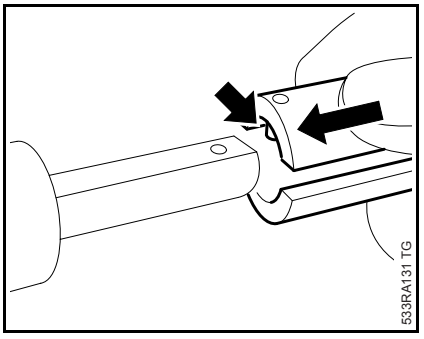
- Push the large slotted diameter of the sleeve over the magnet and snap ring.

The inner pin (2) must point towards the flat face (3) of the tool's shank.



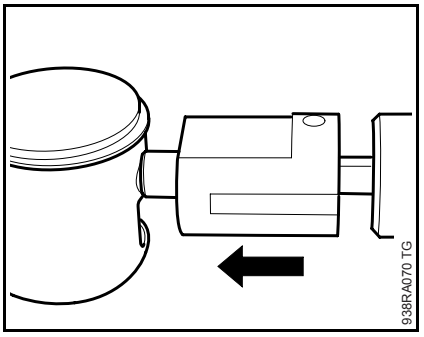
- Press the installing tool downwards into the sleeve until the magnet butts against the end of the guide slot.

Use a suitable base (wooden board).



- Remove the sleeve and push it on to the other end of the shank as far as stop.

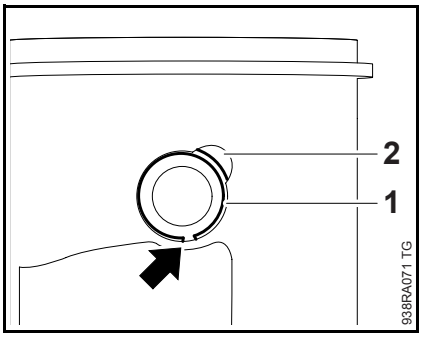
The inner pin (arrow) must again point toward the flat face.



– Position the snap ring against the carrier side of the piston.

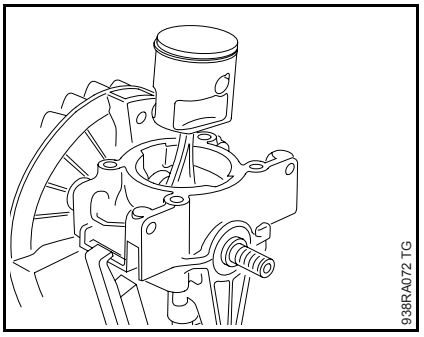
- Apply the installing tool 5910 890 2208 with the sleeve's taper against the piston boss, hold the piston steady, center the tool shank exactly and press home until the snap ring slips into the groove.

Make sure the tool shank is held square on the piston pin axis.



Fit the snap ring (1) so that its gap (arrow) points down – it must not be near the recess (2).

– Check installed position of snap ring.



– Inspect the piston ring and replace if necessary, 🕮 6.7.1

– Install the cylinder, 🕮 6.4

– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

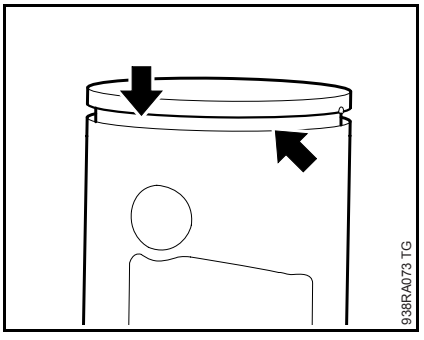
– Tightening torques, 🕮 3.3

– Reassemble all other parts in the reverse sequence.

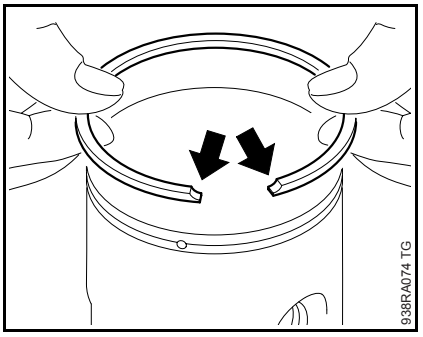
6.7.1 Piston Ring

– Remove the piston, 🕮 6.7

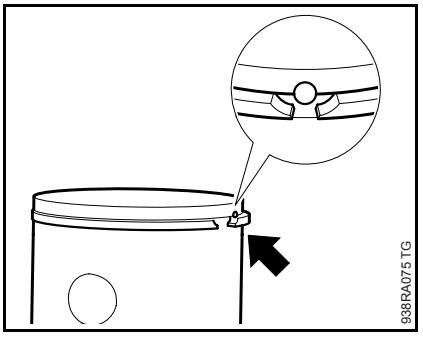
– Remove the piston ring from the piston.



● Use a piece of old piston ring to scrape the groove (arrows) clean.



● Position the new piston ring in the groove so that the radii (arrows) at the ring gap face upwards.



● Position the piston ring so that the radii at the ring gap meet at the fixing pin in the piston groove (arrow).

– Check correct installed position of the piston ring.

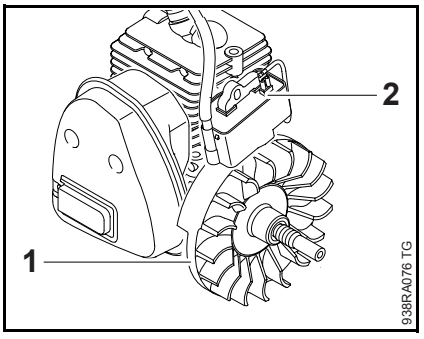
– Install the piston, 🕮 6.7

7. Ignition System

Exercise extreme caution when troubleshooting and carrying out maintenance or repair work on the ignition system. The high voltages which occur can cause serious or fatal accidents.

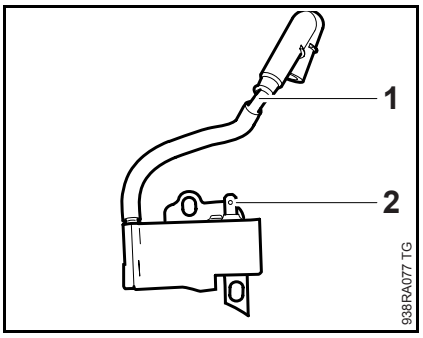
Troubleshooting on the ignition system should always begin at the spark plug, 🕮 4.2

– Remove the shroud – see service manual for "Series 4144 Components – FS, FC, KM"



The electronic (breakerless) ignition system basically consists of an ignition module (2) and flywheel (1).

7.1 Ignition Module



The ignition module accommodates all the components required to control ignition timing. There are two electrical connections on the coil body:

– High voltage output (1) with ignition lead

– Connector tag (2) for the short circuit wire

Testing in the workshop is limited to a spark test. A new ignition module must be installed if no ignition spark is obtained (after checking that wiring, stop switch and flywheel are in good condition), 🕮 7.1.1.

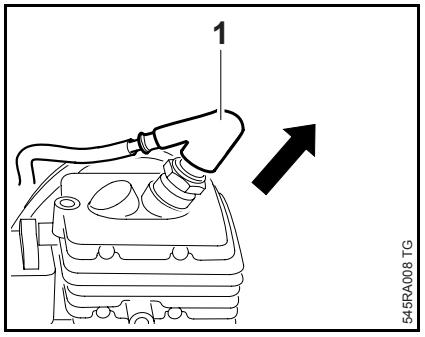
Ignition timing is fixed and cannot be adjusted during repair work.

Since there is no mechanical wear in these systems, ignition timing cannot get out of adjustment during operation.

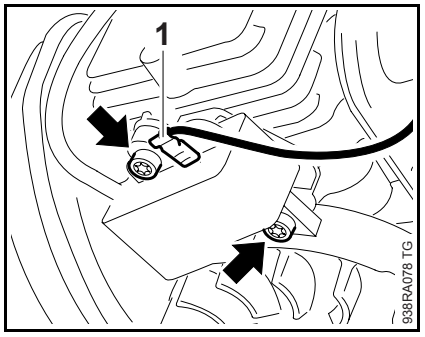
7.1.1 Removing and Installing

– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

The air gap between the ignition module and flywheel can be adjusted only when the engine is removed.

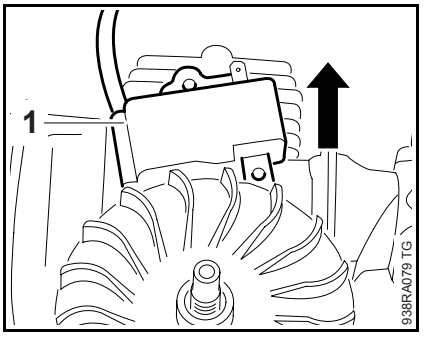


● Pull boot (1) off the spark plug.

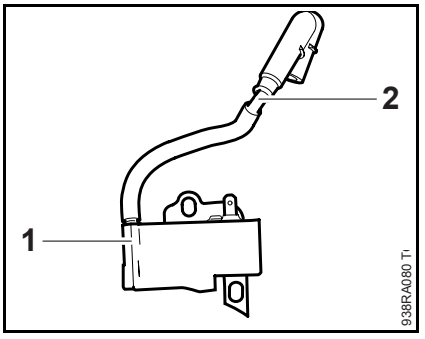


● Disconnect the short circuit wire (1).

● Take out the screws with washers (arrows).

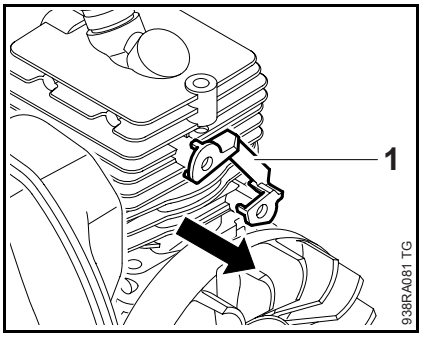


● Remove the ignition module (1).



The ignition module (1) and ignition lead (2) form a unit.

– Check the ignition module (1) and lead (2), and replace if necessary

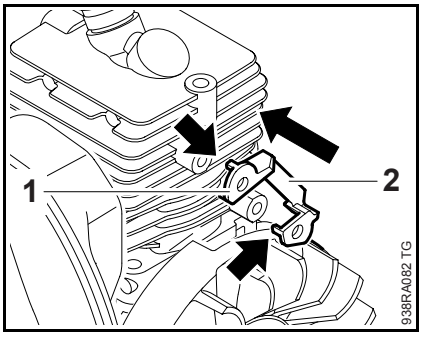


● Remove the insulator (1).

– Check the insulator and replace if necessary.

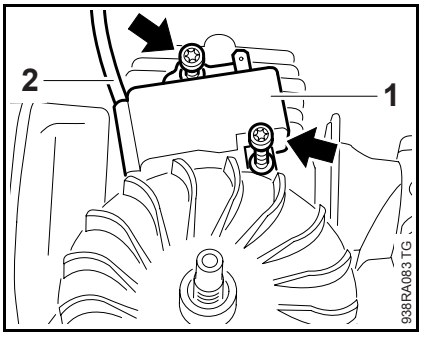
– Check the spark plug boot and replace if necessary, 🕮 7.4

– Troubleshooting, 🕮 4.2

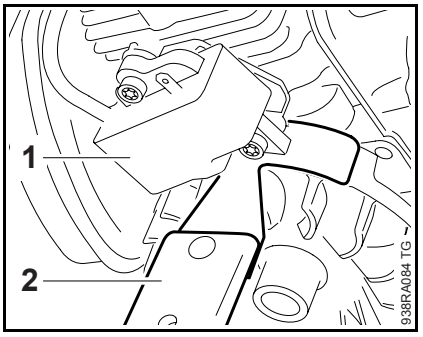


– Position the insulator (1) so that the connecting bar (2) points towards the carburetor.

● Attach the lugs (arrows) of the insulator (1) to the bosses.

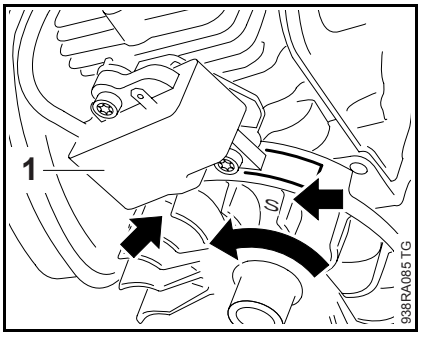


● Place the ignition module (1) in position so that the ignition lead (2) faces the muffler and insert the screws (arrows) with washers – do not tighten down yet.



– Push the ignition module (1) back

● Slide the setting gauge (2) 1127 890 6400 between the arms of the ignition module and the flywheel magnet.



– Push the ignition module (1) back – the flywheel must turn freely.

The setting gauge is not shown in the illustration.

● Hold the setting gauge and rotate the flywheel until the magnet poles (arrows) are next to the ignition module.

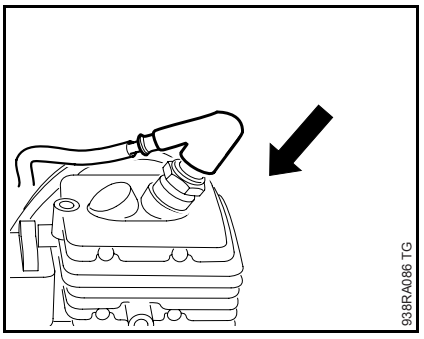
– Press the ignition module against the setting gauge.

– Tighten down the screws firmly.

– Tightening torques, 🕮 3.3

– Remove the setting gauge.

– Check operation
– rotate the flywheel and make sure it does not touch the ignition module.



● Push the boot on to the spark plug.

– Reassemble all other parts in the reverse sequence.

7.2 Ignition Timing

Ignition timing is fixed and cannot be adjusted during repair work.

Since there is no mechanical wear in these systems, ignition timing cannot get out of adjustment during operation.

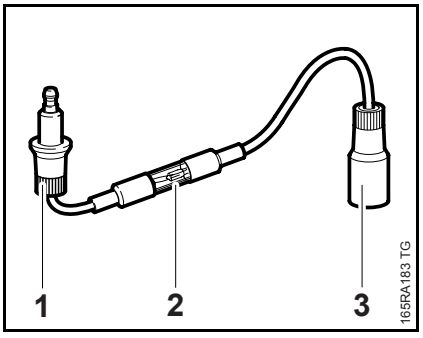
7.3 Testing the Ignition Module

To test the ignition module, use either the ZAT 4 ignition system tester 5910 850 4503 or the ZAT 3 ignition system tester 5910 850 4520.

The ignition test refers only to a spark test, not to ignition timing.

– Remove the shroud – see service manual for "Series 4144 Components – FS, FC, KM"

The following tests are performed on the installed engine.



Using the ZAT 4 ignition tester 5910 850 4503

– Before starting the test, install a new spark plug in the cylinder and tighten it down firmly.

– Tightening torques, 🕮 3.3

● Connect spark plug boot to the input terminal (1). Push the tester's output terminal (3) on to the spark plug.

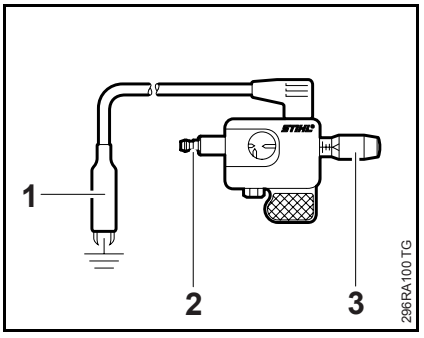
High voltage – risk of electric shock.

● Crank the engine quickly with the rewind starter and check spark in the tester's window (2).

The engine may start and accelerate during the test.

If a spark is visible, the ignition system is in order.

If no spark is visible in the window (2), check the ignition system with the aid of the troubleshooting chart, 🕮 7.6



Using the ZAT 3 ignition tester 5910 850 4520

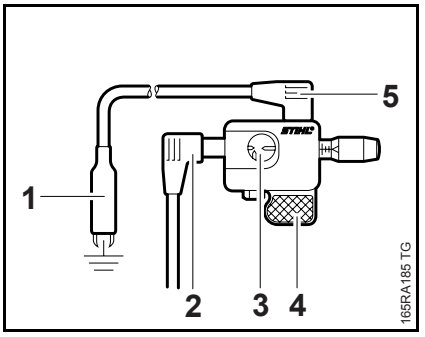
– Before starting the test, install a new spark plug in the cylinder and tighten it down firmly.

– Tightening torques, 🕮 3.3

– Connect spark plug boot to the terminal (2).

● Attach the ground terminal (1) to the spark plug.

● Use adjusting knob (3) to set the spark gap to about 2 mm.



While using the ZAT 3, hold it only by the handle (4) or position it in a safe place. Keep fingers or other parts of your body at least 1 cm away from the spark window (3), high voltage connection (2), ground connection (5) and the ground terminal (1).

High voltage – risk of electric shock.

– Crank the engine quickly with the rewind starter and check spark in the tester's window (3).

The engine may start and accelerate during the test.

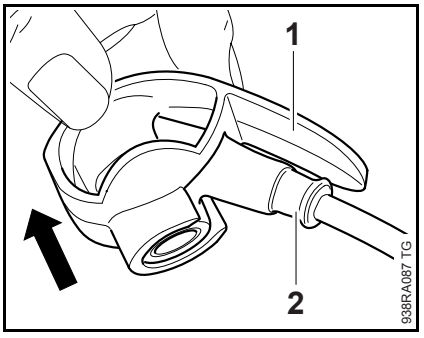
If a spark is visible, the ignition system is in order.

If no spark is visible in the window (3), check the ignition system with the aid of the troubleshooting chart, 🕮 7.6

7.4 Spark Plug Boot

The ignition module (1) and ignition lead (2) form a unit. A new ignition module must be installed if the ignition lead is damaged.

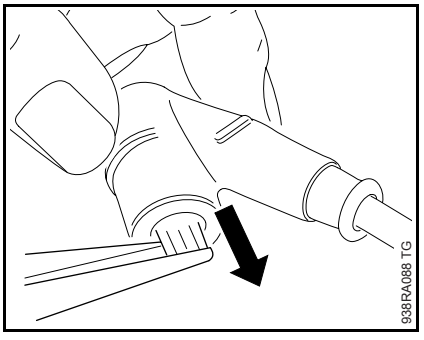
The engine does not need to be removed.



- Pull the cap (1) off the spark plug boot (2).

– Remove the shroud – see service manual for "Series 4144 Components – FS, FC, KM"

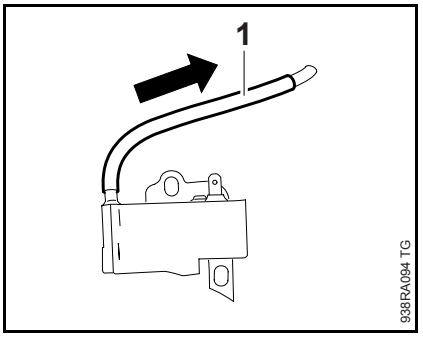
– Pull the boot off the spark plug.



- Use suitable pliers to pull the leg spring out of the spark plug boot.

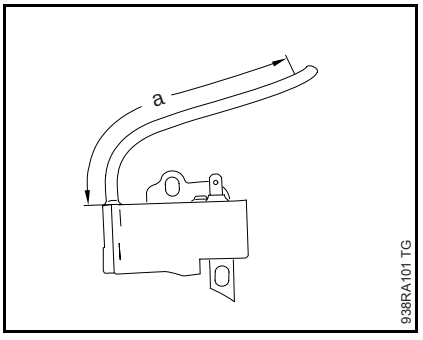
– Unhook the leg spring from the ignition lead.

– Pull the boot off the ignition lead.



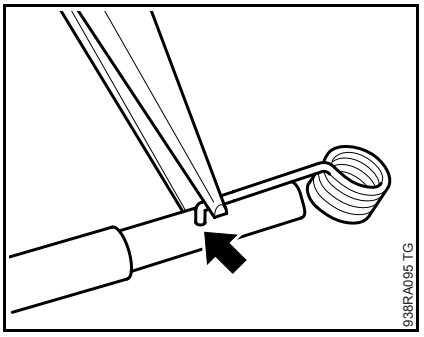
- Remove the protective tube (1).

– Check for damage and replace if necessary

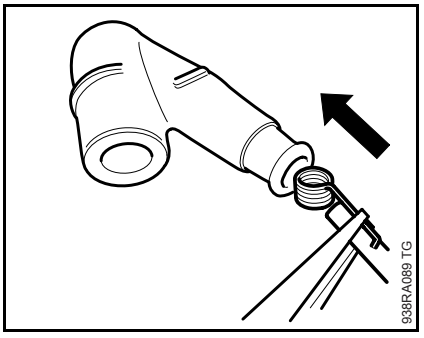


– Use a pointed tool to pierce the center of the new ignition lead's insulation 100 mm from the end of the lead (dimension 'a').

– Fit the protective tube on the ignition lead.

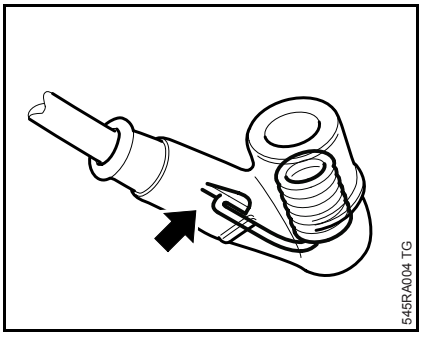


- Pinch the hook of the leg spring into the center of the lead (arrow).



– Coat inside of spark plug boot with press fluid, 🕮 9

- Hold the ignition lead and leg spring together and push them into the spark plug boot.

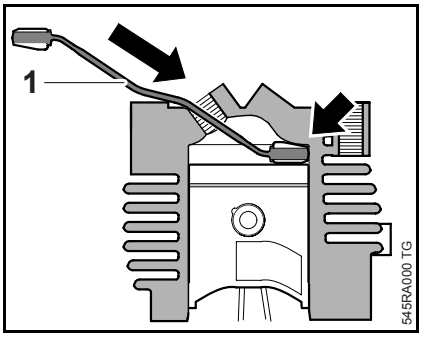


- Make sure the leg spring (arrow) locates properly inside the spark plug boot.

Do not use either graphite grease or silicone insulating paste.

– Reassemble all other parts in the reverse sequence.

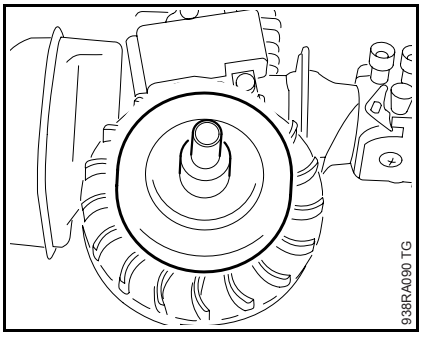
7.5 Flywheel



– Remove the engine – see service manual for "Series 4144 Components – FS, FC, KM"

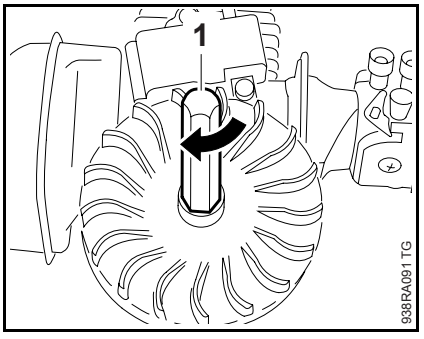
– Unscrew the spark plug.

– Use locking strip (1) to block the piston, 🕮 5.1



– Remove the clutch, 🕮 5.1

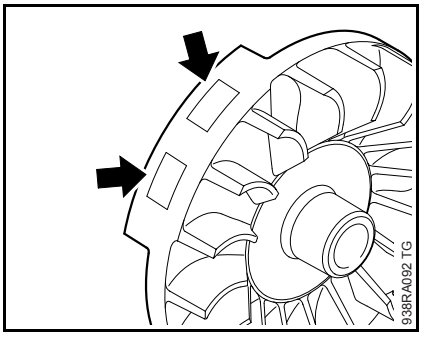
If the flywheel is stuck, use a puller.



- Screw the puller (1) 5910 893 0800 clockwise on to the crankshaft as far as stop, then back it off a 1/4 turn.

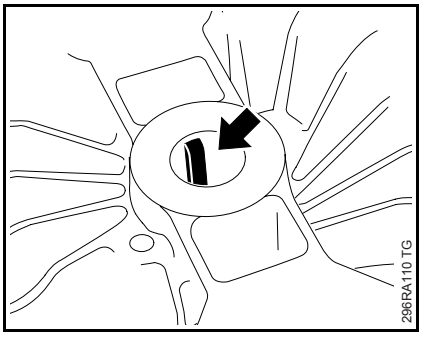
– Tap the end of the puller a few times to release the flywheel – take care not to damage the crankshaft stub or ball bearing.

– Unscrew the puller and remove the flywheel.



The flywheel and magnet poles (arrows) must not be damaged or have turned blue. Replace flywheel if necessary.

Before assembly, degrease the bore in the flywheel hub and the crankshaft stub, 🕮 9.



- Make sure the key (arrow) engages the slot in the crankshaft stub.

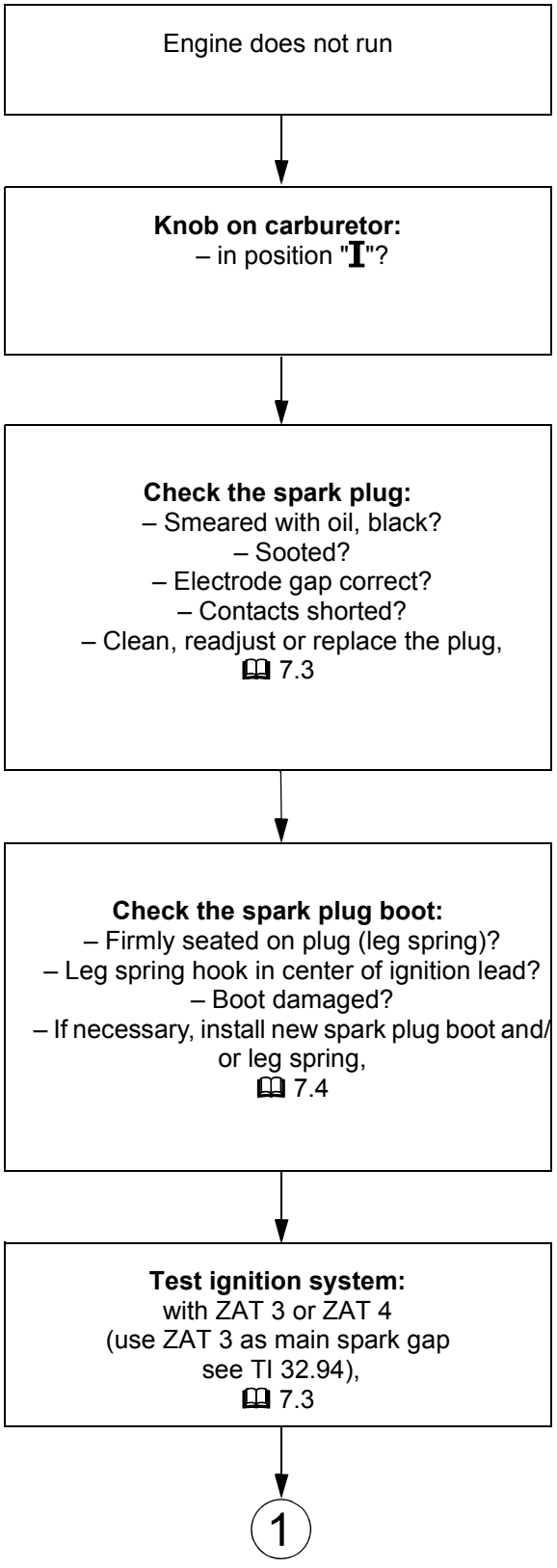
– Check the air gap between the ignition module and flywheel and adjust if necessary, 🕮 7.1.1

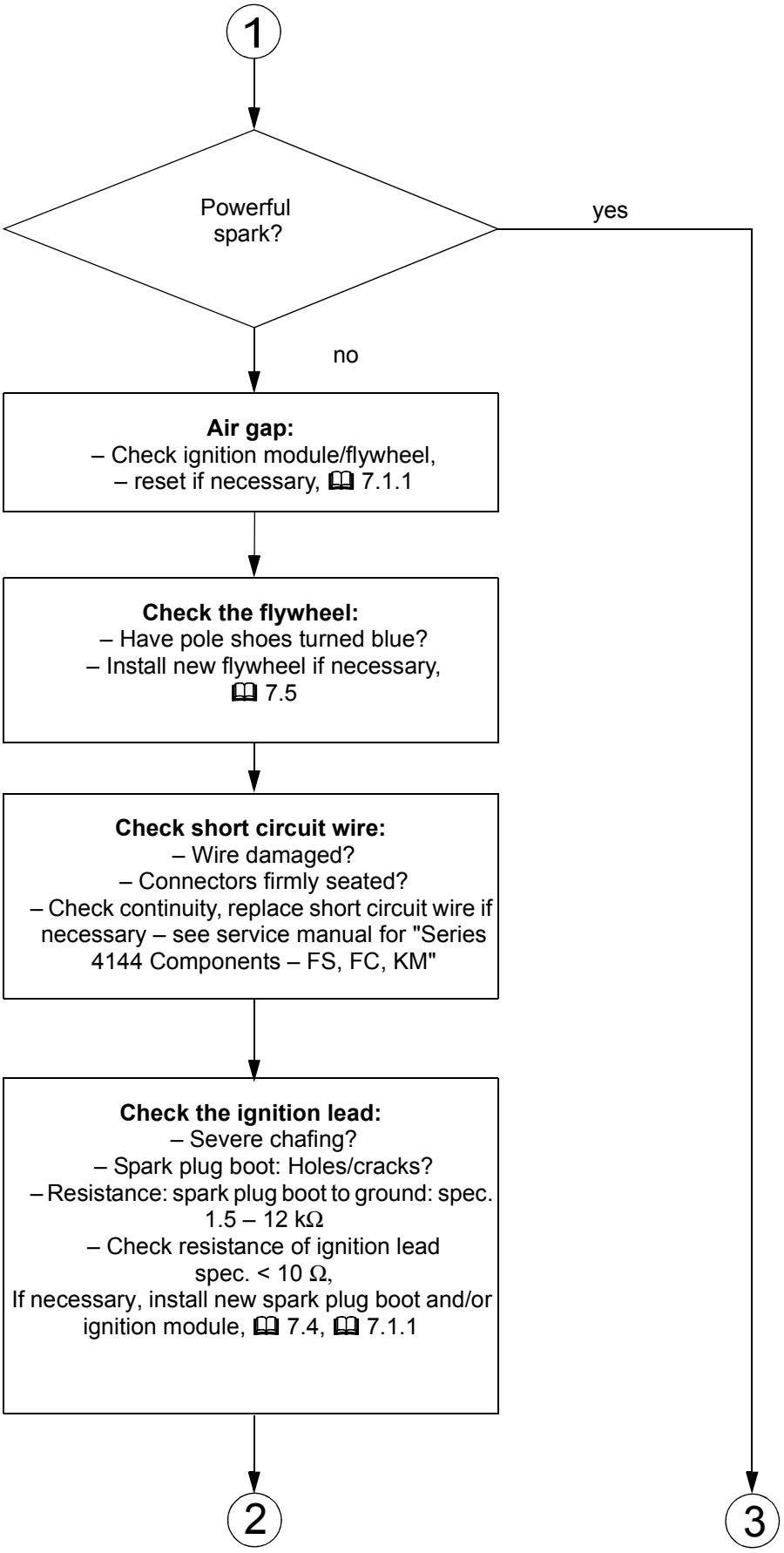
– Reassemble all other parts in the reverse sequence.

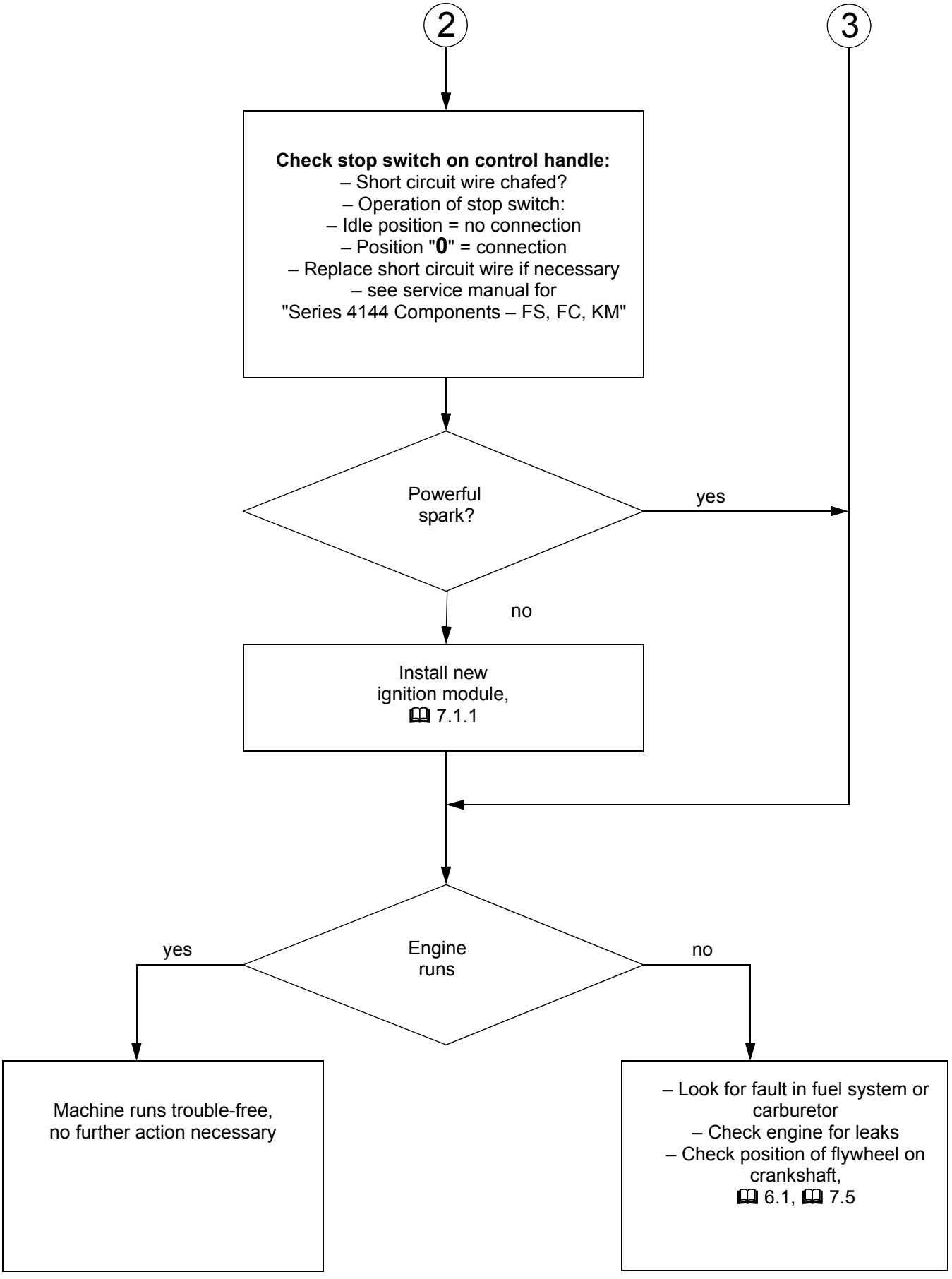
– Tightening torques, 🕮 3.3

7.6 Ignition System Troubleshooting

Troubleshooting can be performed with the engine installed. Refer to service manuals of "Series 4144 Powerhead" or "Series 4144 Components – FS, FC, KM" for descriptions of procedures.




1
Powerful spark?
yes
no
Air gap:
– Check ignition module/flywheel,
– reset if necessary, 🕮 7.1.1
Check the flywheel:
– Have pole shoes turned blue?
– Install new flywheel if necessary,
🕮 7.5
Check short circuit wire:
– Wire damaged?
– Connectors firmly seated?
– Check continuity, replace short circuit wire if necessary – see service manual for "Series 4144 Components – FS, FC, KM"
Check the ignition lead:
– Severe chafing?
– Spark plug boot: Holes/cracks?
– Resistance: spark plug boot to ground: spec. 1.5 – 12 kΩ
– Check resistance of ignition lead spec. < 10 Ω,
If necessary, install new spark plug boot and/or ignition module, 🕮 7.4, 🕮 7.1.1
2
3


2
3
Check stop switch on control handle:
– Short circuit wire chafed?
– Operation of stop switch:
– Idle position = no connection
– Position "0" = connection
– Replace short circuit wire if necessary
– see service manual for
"Series 4144 Components – FS, FC, KM"
Powerful spark?
yes
no
Install new ignition module, 🕮 7.1.1
Engine runs
yes
no
Machine runs trouble-free, no further action necessary
– Look for fault in fuel system or carburetor
– Check engine for leaks
– Check position of flywheel on crankshaft,
🕮 6.1, 🕮 7.5

8. Special Servicing Tools

New Special Tools

No.	Part Name	Part No.	Application	Rem.
1	Test flange	5910 850 4200	Crankcase leakage test	
2	Sleeve (with 20° chamfer)	5910 893 1708	for intstalling tool 8	
3	Puller	5910 893 0800	Removing flywheel	

Existing Special Tools

No.	Part Name	Part No.	Application	Rem.
1	Locking strip	0000 893 5904	Blocking the piston	
2	Carburetor and engine tester	0000 850 1300	Testing engine and carburetor for leaks	
3	Puller	5910 890 4501	Removing limiter caps	
4	Screwdriver	5910 890 2305	Adjusting carburetor with limiter cap	
	- Setting disk	5910 893 6600	Add-on for screwdriver (adjusting carburetor)	
5	Screwdriver bit	0812 540 1112	Removing and installing spline socket screws with electric or pneumatic screwdrivers; tighten down screws with torque wrench, releasing clutch drum	
6	Wrench	4130 890 3600	Loosening clutch	
7	Hook	5910 890 2800	Detaching springs on clutch shoes	
8	Setting gauge	1127 890 6400	Adjusting air gap between the ignition module and flywheel	
9	Ignition system tester, ZAT 4	5910 850 4503	Testing ignition system	
10	Ignition system tester, ZAT 3	5910 850 4520	Testing ignition system	
11	Puller	5910 890 4400	Removing oil seals	
	- Jaws (No. 3.1 + 4)	0000 893 3706	Removing oil seal(s)	
	- Jaws (No. 2)	0000 893 3700	Holding engine pan on crankcase	
	- Threaded bushing	1108 893 4500	Preparing puller	
12	Press sleeve	1129 893 2400	Installing oil seals	
13	Hook	5910 893 8800	Removing pickup body	
14	Press sleeve	1121 893 2400	Installing oil seals	
15	Installing sleeve	4119 893 4600	Protects oil seal at starter side	

No.	Part Name	Part No.	Application	Rem.
16	Clamping strap	0000 893 2600	Clamping ring around piston	
17	Assembly drift	1130 893 4700	Removing and installing piston pin	
18	Wooden assembly block	1108 893 4800	Supporting the piston	
19	Installing tool 8	5910 890 2208	Installing hookless snap rings in piston	

No.	Part Name	Part No.	Application	Rem.
20	Torque wrench	5910 890 0302	0.5 to 18 Nm	

No.	Part Name	Part No.	Application	Rem.
21	Torque wrench	5910 890 0312	6 to 80 Nm	
22	Screwdriver bit, T 27 x 125	0812 542 2104	Removing and installing spline socket screws with electric or pneumatic screwdrivers; tighten down screws with torque wrench (4 mm)	
23	Screwdriver bit, T 27 x 150	5910 890 2400	IS-P screws (4 mm)	
24	Screwdriver Q-SW 8 x 200	5910 890 2420	Hex screws and nuts	1

Remarks

1) Use for releasing only.

No.	Part Name	Part No.	Application
1	Lubricating grease (225 g tube)	0781 120 1111	Oil seals, sliding and bearing points
2	STIHL special lubricant	0781 417 1315	Bearing bore in rope rotor, rewind spring in starter
3	Press fluid OH 723	0781 957 9000	Rubber elements of AV system
4	STIHL multipurpose grease	0781 120 1109	High voltage output on ignition module
5	Dirko HT red sealant	0783 830 2000	Crankcase, oil seals (outside)
5	Medium-strength threadlocking adhesive (Loctite 242)	0786 111 2101	
6	High-strength threadlocking adhesive (Loctite 270)	0786 111 2109	
7	High-strength threadlocking adhesive (Loctite 648)	0786 111 2117	
8	Standard commercial solvent-based degreasant containing no chlorinated or halogenated hydrocarbons		Cleaning sealing faces and carburetor, crankshaft stubs and flywheel taper
9	Mounting paste	0781 130 1014	Lubrication between crankshaft stub and clutch drum

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